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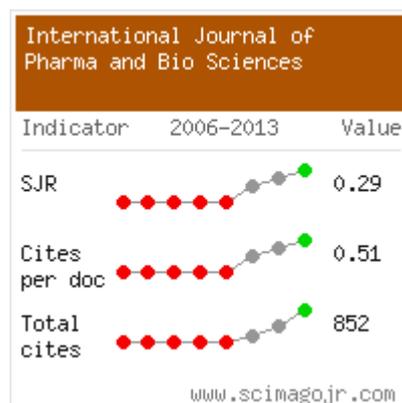
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# **International Journal of Pharma and Bio Sciences (IJPBS)**

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## **Guest Editors**

Sasireka Jayapal

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# Design and Implementation of Convergence Artworks Using Open Source Hardware for STEAM Education

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## Abstract---

**Background/Objectives:** The system to recreate an existing work of art into a work of convergence artworks that enables interaction with viewers utilizing the open source hardware "arduino" and electronic components was designed and implemented.

**Methods/Statistical analysis:** The implemented work of convergence art was configured in such a way that arduino, various sensors and the actuator were connected to the existing work of art to move a part of the picture or operate output devices such as LED and speaker according to the interaction with viewers. Also, the viewers were allowed to control and appreciate the work of convergence art actively using an android device.

**Findings:** In this study, the system to recreate an existing work of art into a work of convergence artworks that enables interaction with viewers utilizing the open source hardware "arduino" and electronic components was designed and implemented. It was possible to create a new work of art by combining electronics and communication technologies using arduino and electronic components with the existing 2D work of art that enabled the viewers to control such a work of convergence art directly using an android device.

**Improvements/Applications:** It is planned to carry out the application of the STEAM education using electronics and communication technologies in the future based on the suggested results of this study and a follow-up study to apply it to various fields of study in the future.

**Keywords---** Convergence Artworks, STEAM Education, Open Source Hardware, Arduino, Information Technology.

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## I. INTRODUCTION

Recently, hardware such as Arduino, Raspberry Pi and Intel Edison is being distributed at lower prices due to the technology development of open source hardware platforms. Several studies have been conducted on the application of open source hardware technology to various fields, including education, agriculture, and security<sup>1-3</sup>. In the 21st century, science and technology are being required to go beyond the fusion of fields close to science and technology and shift into integrated fusion science and technology that embraces the humanities and social sciences. Arduino is a type of open-source hardware that receives a signal from connected input devices, enabling the control of LEDs or motors. Arduino is being applied to convergence researches in various fields as a tool which can provide actual learning experience in electric, electronic and communication technologies such as electronic circuits and components<sup>4</sup>. Arduino is also being applied to the STEAM education which is an interdisciplinary approach to educate students in science, technology, engineering, arts and mathematics through actual and integrated learning experience<sup>5</sup>.

However, there have been few studies on this field, and almost no studies have been conducted on the creation of an existing work of art into a work of convergence artworks. Therefore, the purpose of this study is to present measures to develop the production system of convergence artworks using arduino which is an open-source hardware platform and electronic components and apply such a system to the STEAM education.

## II. LITERATURE REVIEW

Advanced information and communication technologies have created fusion art forms, such as techno music and video art, providing new materials to arts. Digital technology has enabled the utilization of various physical reactions such as image, sound, and light as an element of art works. In addition, digital technology is opening new artistic prospects through the fusion of image, sound, light, and various formative elements, providing an environment that helps communication between audiences and art works. Root-Bernstein & Root-Bernstein<sup>6</sup> asserted that science and technology are complementary to art, while science enhances art and art enhances science. In addition, Hindle<sup>7</sup> discovered by analyzing creative people who had changed their occupation from "artist" to "inventor" that their previous training in art was what enabled their inventions, asserting that artistic talent enhances scientific capabilities. One representative example in which the mutual complementarity of science and technology and art is shown is the fusion of technology (engineering) and art. In this field, the extension of artistic expression through technologies is pursued, and artistic works are prepared by using video, visual media, computer software, electronic parts, and the like. A representative example of this field is media art, which incorporates video art, interactive art, kinetic art, and robotic art. However, there have been few studies on this field, and almost no studies have been conducted on the creation of novel fusion art works by using conventional art works.

Open source hardware, which is an extension of the concept of open source software, is leading a new movement of sharing, reproducing, and redistributing ideas in fields of art, such as media art and design. The interconnection of hardware and software to control technologies such as various sensors, motors, and LEDs with artistic works has enabled more diverse and creative expressions. Thus, turning hardware into open sources and sharing and reproducing ideas through fusion technologies have drawn much attention in the field of fusion art, where advanced information and communication technology and art are interconnected. Arduino is an AVR processor-based open source microcontroller board that was developed by Massimo Banzì and David Cuartielles in 2005. Arduino is a physical computing platform based on open source, and provides an integrated development environment (IDE) for the development of the board and software<sup>8</sup>. An Arduino can control LEDs or motors by receiving input values through connected switches or sensors, to produce things that may interact with the surrounding environment. In addition, Arduino enables the interconnection with software programs such as Flash, Processing, and Max/MSP, and can be extended through Shield to use such devices as Ethernet, LCD, Bluetooth, Midi, DMX, Zigbee, and GPS. Figure 1 shows the Arduino Uno board, which is one of the most frequently used Arduino boards. Arduino provides free IDEs such as the one shown in Figure 2 at <http://arduino.cc><sup>9</sup>. Arduino programming, called "Sketch," is similar to C/C++ and is easy enough for beginners to understand. The advantage of Arduino is that it enables those who are not fluent in programming languages to use "Sketch." These functions are utilized for brief software education in experience-focused technology education to improve students' problem-solving abilities<sup>5</sup>.



Figure 1: Picture of an Arduino UNO Board Used to Develop the Convergence Artworks

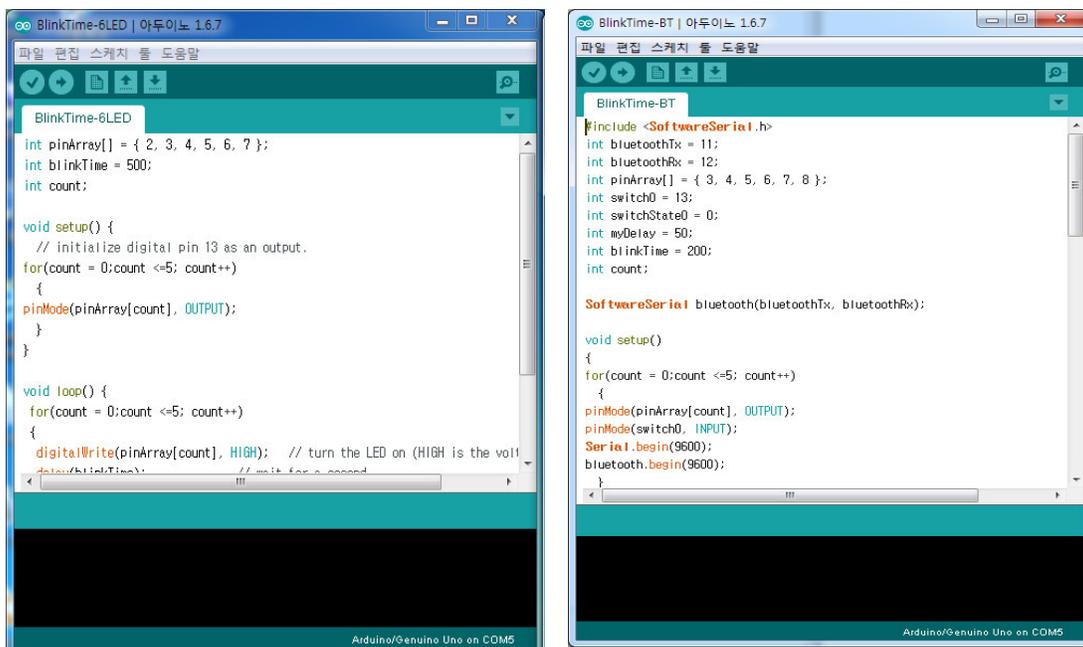


Figure 2: Screenshot of the Arduino IDE Interface Used to Develop the Convergence Artworks

### III. PROPOSED WORK

#### A. System Design

The work of convergence art which is intended to be produced in this study features arduino, various sensors, actuator and Android-based control system. The achieved work of convergence art is recreated based on an existing work of art and the blue tooth module and output devices such as motor and LED are connected to the work of art and it is controlled using arduino. Various sensors connected to the work of art can operate the actuator according to the movement of a viewer to move a part of the picture or turn on LED. Also, the suggested work of convergence art was designed to allow a viewer to control and appreciate the work of convergence art directly using an Android device. In this study, the procedure to produce a work of convergence art using the painting "The Walk, Promenade (Chagall, 1917)" as shown in Figure 3 was suggested. The convergence artworks suggested in this study are the resource for the STEAM education which allows students to learn computational thinking ability and the principle of electric and electronic components through the production process of artworks. It is possible to combine knowledge of science, technology, engineering and mathematics in the process of implementing convergence artworks using Arduino, enhancing interest in science and mathematics.

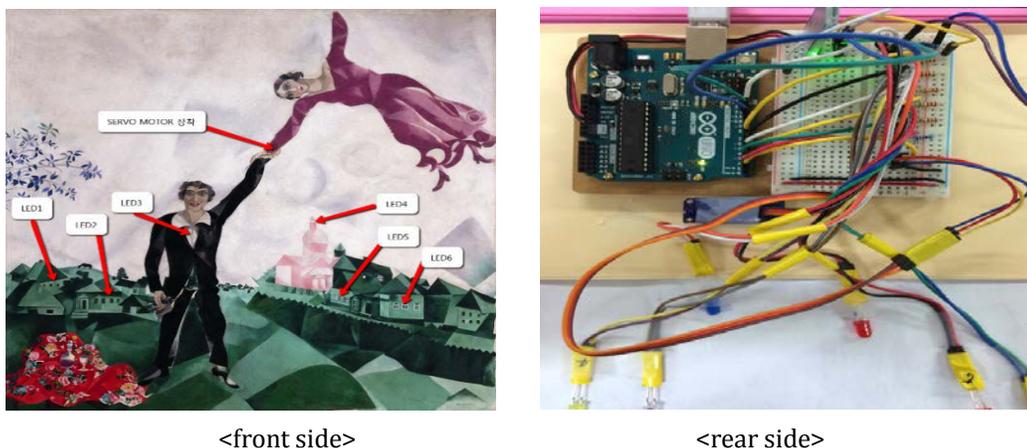


Figure 3: Proposed Convergence Artworks Using Painting The Walk, Promenade (Chagall, 1917)

### B. System Implementation

The development environment for the work of convergence art intended to be produced in this study consists of arduino, servo motor and LED, and the Bluetooth communication is used for communication. Two paintings are printed from the image file of the existing painting and one printed painting is modified through the image editing program by considering the parts where the sensors and the actuator are installed. A sketch to recreate the existing work of art is drawn using the remaining printed drawing and the program is downloaded to arduino installed at the back of the drawing to complete the work of convergence art. Figure 4 shows the work of convergence art completed using the motor, LED and Bluetooth module and the Android application screen where such work related to the convergence area can be controlled.

It is expected that students will understand the fundamental principles of programming and learn convergence thinking ability through the experience of creating such convergence artworks. Also, the STEAM class to recreate artworks with Arduino which is a product of the most advanced scientific technology, LEDs and motors will stimulate the creativity and artistic sensitivity of students.

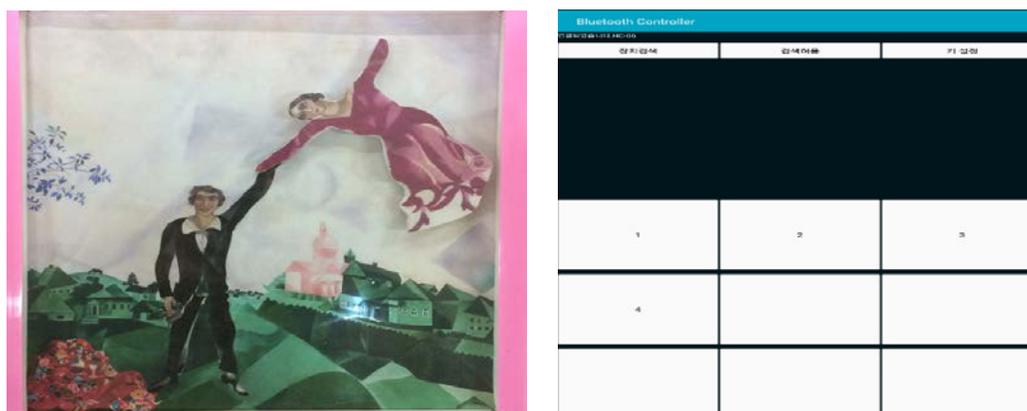


Figure 4: The Final Result of Convergence Artworks and Android User Interface

## IV. CONCLUSION

In this study, the system to recreate an existing work of art into a work of convergence art that enables interaction with viewers utilizing the open source hardware "arduino" and electronic components was designed and implemented. It was possible to create a new work of art by combining electronics and communication technologies using arduino and electronic components with the existing 2D work of art that enabled the viewers to control such a work of convergence art directly using an android device. The Korean Ministry of Education has been adopting and applying STEAM education to the national curriculum as an educational policy since 2010<sup>10</sup>. It is planned to carry out the application of the STEAM education using

electronics and communication technologies in the future based on the suggested results of this study and a follow-up study to apply it to various fields of study in the future.

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## A Study on Knowledge of Oral Health and Practical Behavior of Nursing Students in Korea

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### Abstract---

**Background/Objective:** This study was designed to identify knowledge of oral health and practical behaviors of nursing students in accordance with their educational experience and educational needs.

**Methods/Statistical analysis:** The subjects of this study were nursing students at two universities in Chungnam, Korea. A total of 356 students' data were collected for this study. This study performed analysis using descriptive statistics, t-test, ANOVA and Scheffe's test using SPSS 22.0.

**Findings:** Differences in knowledge of oral health and educational experience were observed in subjects who received oral health education via nursing courses. Students that showed no intention to participate in oral health education represented higher levels knowledge of oral health. Differences in oral health practical behaviors showed that students needed a family member, and practical training was associated with higher oral health education. Those students who did not intend to participate in oral health education were more numerous.

**Improvements/Applications:** Therefore, the current study shows that although subjective awareness of the importance of nursing students' oral health was sufficient, it was acutely required for to improve accessibility.

**Keywords---** Oral Health, Nursing Students, Knowledge, Behavior.

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## **I. INTRODUCTION**

To extend lifespan, quality of life has become significantly important. Interest in oral health and oral function has increased<sup>1,2</sup>. Accordingly, the main parameters affecting quality of oral care have been reported<sup>3,4,5</sup>. Oral health is not affected by oral disease but refers to oral tissue organization in mental and social life<sup>6</sup>. Oral disease has very high socio-economic burden.

In Korea, management measures at the national level added a dental check-entry to the 'National Health and Nutrition Examination Survey' from 2007 and ran a quality control.

In addition, according to the Department of Health and Human Services data, periodontal disease affects more than 60 percent of adults aged 20 years and rapidly causes loss of teeth after 40 years of age. Therefore, it is important that education on knowledge of oral health and practical behavior improves oral health awareness to maintain oral health.

College is when values are established for independent adults. This period is the time for learning specialized knowledge and skills<sup>7</sup>. Since college students are similar in age, analysis of oral health of college students is very important<sup>8</sup>.

Especially, nursing students are important in the future health of many people, and students learn health-related disciplines. Nursing students have an obligation to become a model of health behavior, and it is important to practice health promotion actions<sup>9</sup>.

Therefore, it is important that nursing college students learn about oral health practices.

In this study, we calculated the degree of nursing students' knowledge of oral health and practical behaviors by analyzing differences in level of education in order to determine knowledge of oral health and practical behavior in nursing students.

## **II. METHODS**

### **A. Study Design and Sample**

This study identified knowledge of oral health and practical behavior in nursing students depending on education experience and education requirement on oral health. This study was a cross-sectional survey that explored differences between knowledge of oral health and practical behaviors conducted in accordance with oral health education experience.

The subjects of this study were nursing students in Chungnam. The questionnaire was distributed using a smartphone application. A total of 356 students responded to the survey.

### **B. Measurement**

Each questionnaire was made on the advice of experts based on previous research. Oral health knowledge part consisted of 14 questions and a 5-point Likert scale. A higher score means higher knowledge of oral health. In this study, reliability was Cronbach's alpha=.78. Oralhealth practical behavior was composed of 16 items. A higher score means higher practical behavior of oral health. The reliability of this study was Cronbach's alpha=.62.

### **C. Statistical Analysis**

Data were analyzed using the SPSS WIN 22.0 program. The demographics of the subjects and educational needs were analyzed for frequency and percentage. The differences between knowledge of oral health and practical behavior in accordance with demographics and educational needs were analyzed by t-test, ANOVA and Scheffe's test.

## **III. RESULTS**

### **A. Demographics**

As shown in Table 1, most subjects were women(90.7%), and 19-22 years old was the most common(84.0%) age group. However, grade level groups were relatively evenly distributed. Students with cavities (54.2%) and students that had tooth treatments (75.6%) were the majority. Subjective oral health status showed that students(41.9%) were the most common.

Table 1: Demographics

Characteristics	Categories	N	%
Gender	Male	33	9.3
	Female	323	90.7
Age	≤ 18 years	21	5.9
	19 ~ 22 years	299	84.0
	23 years ≤	36	10.1
Grade level	Freshman	85	23.9
	Sophomore	142	39.9
	Junior	61	17.1
	senior	68	19.1
Having cavity	Yes	193	54.2
	No	163	45.8
Having experimental of dental treatment	Yes	269	75.6
	No	87	24.4
Subjective oral health status	Good	112	26.7
	Usually	149	41.9
	Bad	95	31.5

### B. Oral Health Educational Experience and Educational Needs

As shown in Table 2, most students experienced oral health education (84.6%), and the most common student received oral health education in schools and educational institutions (74.8%). The percentage of students who received oral health education in nursing classes was only 23.9%, and most students were trained in fundamental nursing (48.1%) and adult health nursing(19.8%). Exactly 62.6% responded that they needed oral health education in nursing classes, and one person replied that they had no intention (9.0%).

Table 2: Education Experience and Education Needs on Oral Health

Item	students(n=200)
	n(%)
Oral Health Education experience	
Yes	301(84.6)
No	55(15.4)
Oral Health Education Place(n=301)	
Dental Hospital(clinic) or Health care center	59(19.6)
TV, radio or internet	13( 4.3)
School or educational institution	225(74.8)
Family or other	4( 1.3)
Nursing class of oral health education experience	
Yes	85(23.9)
No	271(76.1)
Course conducted by the Oral Health Education(n=81)	
Fundamental Nursing	39(48.1)
Adult Health Nursing	16(19.8)
Community Health Nursing	6( 7.4)
Public Health education	6( 7.4)
Others	14(17.3)
The need for oral health education in nursing class	
Need	223(62.6)
Usually	104(29.2)
Not necessary	29(8.1)
Intended to receive oral health education	
Yes	32(9.0)
Usually	122(34.3)
No	202(56.7)

### C. Knowledge of Oral Health and Practical Behaviors According to General Characteristics

The differences between knowledge of oral health and practical behaviors in accordance with demographics of subjects are shown in Table 3. Higher grade level and better subjective oral health status were associated with higher knowledge of oral health. Age was associated with cavities, and better subjective oral health status was associated with higher degree of practice behavior on oral health.

Table 3: Knowledge of Oral Health and Practical behavior According to Demographics

Characteristics	Categories	Knowledge of oral health			Practice behavior		
		M(±SD)	t or F	p Scheffe	M(±SD)	t or F	p Scheffe
Gender	Male	51.56(±6.51)	-.836	.403	23.94(±3.04)	-.114	.909
	Female	52.03(±5.43)			23.75(±2.74)		
Age	≤ 18years	51.32(±5.19)	1.191	.305	24.32(±1.98)	3.189	.042 (a<c)
	19~22 years	51.82(±5.57)			23.83(±2.86)		
	23 years	53.88(±5.37)			22.84(±2.17)		
Grade	Freshman	50.64(±5.83) <sup>a</sup>	6.117	<.001 (a<b,c<d)	23.89(±2.64) <sup>a</sup>	2.468	.062
	Sophomore	52.01(±5.27) <sup>b</sup>			24.07(±2.94) <sup>b</sup>		
	Junior	52.27(±5.11) <sup>c</sup>			23.13(±2.67) <sup>c</sup>		
	Senior	54.22(±5.54) <sup>d</sup>			23.27(±2.47) <sup>d</sup>		
Having cavity	Yes	52.50(±5.55)	1.758	.080	23.00(±2.88)	4.797	<.001
	No	51.54(±5.53)			24.43(±2.49)		
Having experience of dental treatment	Yes	51.63(±5.61)	-1.147	.252	24.03(±2.92)	-.546	.586
	No	52.10(±5.54)			23.68(±2.72)		
Subjective oral health status	Good	51.61(±5.63) <sup>a</sup>	5.541	.004 (a>b,c)	23.95(±2.81) <sup>a</sup>	9.088	<.001 (a>b)
	Usually	51.26(±5.44) <sup>b</sup>			24.27(±2.58) <sup>b</sup>		
	Bad	53.28(±5.45) <sup>c</sup>			22.93(±2.81) <sup>c</sup>		

**D. Knowledge of Oral Health and Practical Behavior According to Educational Experience and Educational Needs**

Knowledge of oral health and practical behavior according to educational experience and educational needs are shown in Table 4. Students who took an oral health education nursing class, need for oral health education in nursing classes, and no intention to receive oral health education had higher degrees of knowledge on oral health. Practice behavior of oral health was associated with the highest education from families. In addition, people who received education in nursing classes and those who did not intend to receive oral health education had higher practice behavior of oral health.

Table 4: Knowledge of Oral Health and Practical Behavior According to oral Health Educational Experience and Educational Needs

Characteristics	Categories	Knowledge of oral health			Practice behavior		
		M(±SD)	t or F	p Scheffe	M(±SD)	t or F	p Scheffe
Education experience	Yes	52.44(±5.77)	.910	.364	23.52(±2.76)	1.221	.223
	No	51.18(±5.07)			24.21(±2.74)		
Education Place	Dental Clinic et al.	53.47(±5.79)	.772	.510	22.74(±2.72)	3.762	.011 (c<d)
	TV, radio or internet	52.23(±7.71)			22.30(±3.61)		
	School or educational institution	52.22(±5.69)			23.84(±2.70)		
	Family or other	52.75(±4.03)			22.00(±1.41)		
Nursing class of oral health education experience	Yes	54.23(±5.49)	4.693	<.001	23.19(±2.66)	2.352	.019
	No	51.41(±5.43)			23.92(±2.78)		
The need for oral health education in nursing class	Need	53.40(±5.47)	19.059	<.001 (a>b>c)	23.43(±2.70)	7.383	.001 (a>c)
	Usually	50.04(±4.73)			24.16(±2.59)		
	Not necessary	48.00(±5.23)			25.03(±3.56)		
Intended to receive oral health education	Yes	49.80(±5.69)	9.339	<.001 (a,b<c)	24.43(±2.82)	12.028	<.001 (a,b>c)
	Usually	50.66(±5.08)			24.47(±2.64)		
	No	53.12(±5.55)			23.24(±2.77)		

### E. Correlation Between Knowledge of Oral Health and Practical Behavior

Correlation between knowledge of oral health and practical behavior is shown in Table 5. knowledge of oral health and practical behavior had a positive correlation. In other words, higher oral health knowledge was associated with higher oral health practice behavior.

Table 5: Correlation between Knowledge of Oral Health and Practical Behavior

	Knowledge of oral health	Practical behavior
Knowledge of oral health	1	
Practical Behavior	.417(<.001)	1

## IV. DISCUSSION AND CONCLUSION

Recently, the average life span among OECD member countries was reported to be 80.4 years, and Korea's life expectancy is 81.8. Moreover, disability adjusted life expectancy was reported to be 65.4 years<sup>10</sup>. In particular, oral health and ongoing management are necessary for increased life expectancy. According to Mcgrath's study (2000), 72 percent of subjects responded that oral health is an important factor in the quality of life. Oral health practice behavior is important to improve awareness through education on attention and behavior about oral health<sup>11</sup>. According to the 2012 Korea Health Promotion Foundation report, a lasting framework for improving oral health awareness was proposed to develop oral disease surveillance systems that reflect the characteristics of each age group<sup>12</sup>. Therefore, this study attempted to develop a practice model for oral health promotion in nursing students. The aim of current study was to determine the level of knowledge on oral health and practical behavior in nursing students and analyze differences in education and demand. Education about oral health can provide correct information, leading to improved awareness, adoption of healthy lifestyles, and positive attitudes<sup>13</sup>. We recognized the need for an oral care system for nursing students to measure the degree of knowledge on oral health and practical behavior to encourage education about oral health and provide base data.

The main findings presented that while the proportion of students with oral health education experience was high, experience of nursing courses on oral health was low. To answer the question 'Do you need education about oral health in the nursing field?' 62.6% of subjects answered in the affirmative. The results are similar to Kim and Heo's (2008) study and underscores the need for regular oral health education<sup>14</sup>. However, only 9% answered that they were willing to participate. Therefore, the outcomes of the recent study show that although subjective awareness of importance of nursing students' oral health was sufficient, it was required to improve accessibility. For this, motivation through regular check-ups and accurate public relations is necessary to promote oral health. Furthermore, Park and Lee (2013) mentioned that bad breath, jaw joint disorder, gum disease, oral health presence levels, and scaling are related to quality of life<sup>15</sup>. Kim and Heo's (2008) study on oral health experience of health-related and health-unrelated majors showed that nursing majors have strong motivation with regard to necessity of education of oral health<sup>14</sup>. Thus, to improve quality of life of nursing students, oral health education must be a realistic goal. Students who received oral health education in nursing class had higher levels of oral health practice behavior. As a result, education of nursing students about oral health is important.

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# Elementary School Teachers' Knowledge, Disease Management Ability, and Educational Needs Regarding Asthma and Allergic Diseases

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## Abstract---

**Background/Objectives:** We evaluated the knowledge, management, and education needs related to asthma and allergic diseases among elementary school teachers in South Korea.

**Methods/Statistical analysis:** Participants were 191 elementary school teachers assessed using a structured questionnaire. Participants were initially divided into two groups according to whether they had experience asthma and allergic disease. The demographic characteristics and main variables were compared between the groups using independent t-tests and chi-square tests; IBM SPSS Statistics 22 was used for these analyses. Pearson's correlation coefficient( $r$ ) was calculated to identify the relationship among the variables in each group.

**Findings:** About 40% of teachers had experience in asthma or allergic disease; the remainder had no experience. The demographics, except years of education, did not significantly differ between these two groups. Participants' scores for knowledge, disease management, and educational needs did not differ between the groups. Notably, the knowledge score of the no-experience group was higher than that of the experience group, whereas the opposite was true for disease management scores. Perceptions of the educational needs of both groups were similar. Disease management ability was significantly positively associated with knowledge and educational needs in the experience group. However, there were no relationships between knowledge, disease management, and educational needs in the no-experience group. We concluded that school teachers with experience in asthma/allergic disease had better disease management ability than did the no-experience group.

**Improvements/Applications:** Systematic, continuous programs aiming to educate school teachers on asthma/allergic disease should be provided according to their individual experiences and needs.

**Keywords---** Asthma, Allergic Disease, Teacher, Knowledge, Management, Educational Needs.

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## I. INTRODUCTION

The lifetime prevalence of physician-diagnosed allergic disease, such as asthma, rhinitis, and atopic dermatitis, has shown a larger increase than any other condition according to the International Study of Asthma and Allergies in Childhood (ISAAC)<sup>1</sup>. Asthma and allergic disease are the first and third greatest contributors to the disease burden in children and adolescents<sup>2</sup>, and are believed to be caused by industrialization, global warming, a westernized diet, an increased intake of drugs such as antibiotics and antipyretics, and so-called rapid environmental changes, such as housing changes<sup>3,4</sup>.

Worsening asthma symptoms can result in activity limitations, thus restricting these children physical, emotional, and social skills. These problems can lead children to feeling left out, impair their relationships with friends, and can make it difficult for them to adapt to the surrounding environment<sup>5</sup>. Additionally, when allergic diseases in childhood and adolescence are not managed properly, it can lead to economic burden and severe disease in adulthood; these factors, coupled with the currently increasing elderly population, can increase the burden on society<sup>4</sup>. Therefore, it is necessary to ensure proper management of asthma and allergic disease through appropriate diagnosis and conservative treatment, including removal of the irritant causing the condition, regulation of inflammation, physical environmental regulation, and emotional stress reduction.

In South Korea, the proportion of individuals who subjectively reported poorly controlled asthma symptoms is twice that in other Asian countries; despite this, the proportion of children who did not go to school because of asthma symptoms was 7% lower than the 53% in the Japan and the 49% in the US<sup>6,7</sup>. This indicates that, despite exhibiting asthma symptoms, many children with asthma are still going to school, making the appropriate management of asthma in schools important. According to Kim and Kwon, 44% of elementary school students received a diagnosis of asthma in the last 6 years, while the case was appealed to the difficulties in 32% of school trained in asthma<sup>8</sup>. Furthermore, 20% of students received aid for asthma, while 22% took medications consistently. Regarding their knowledge of asthma, participants had the lowest knowledge in the areas of asthma prevention and management.

To ensure the self-management of children with asthma and allergic disease, teachers should involve disease management program. However, according to existing research, many teachers lack sufficient knowledge of these conditions and how to manage them<sup>9,10</sup>. In particular, teachers lack sufficient awareness of the causes, symptoms, and management of asthma<sup>11</sup>. According to Seo and Lee,<sup>7</sup> the participation rates of general education teachers in childhood asthma management programs in school were lower than were those of health teachers. Their primary reason for the lack of participation was being too busy, and because they believed the students with asthma themselves did not require anyone to oversee them. However, in a study of 1400 individuals, the percentage of students whose asthma was known to the school health teacher was a scant 0.6%, which was a enormous difference from the 11–15% estimated by the allergy association.<sup>12</sup> This is likely because, in South Korea, there is little general awareness of asthma and allergic disease, and mild symptoms are typically ignored; furthermore, even among those with a diagnosis, if their condition does not require regular management, the condition may be ignored by others. Importantly, individuals who have no experience of such diseases typically lack knowledge and understanding of how to manage dangerous situations. Thus, it would be necessary to perform active dissemination of such information.

Research has shown that the presence or absence of asthma education influenced students' self-management knowledge<sup>6</sup>. Teachers' education on the management of asthma and allergic disease should be conducted prior to students' education. This would ensure that teachers are educated enough to conduct appropriate in-school education of students to promote more effective symptom management. The self-management of asthma symptoms has been shown to differ according to individualism experience and history<sup>13</sup>. In other words, teachers educational needs, knowledge, and disease management ability appear to differ depending on whether they have prior experience of asthma or allergic disease. Therefore, it is necessary to consider it during training on asthma, allergic diseases of the teachers. Park<sup>14</sup> noted that teachers without experience of atopic dermatitis had low levels of knowledge and management ability related to the disease. Sufficient knowledge of disease management is needed to care for patients with asthma and allergic disease effectively. This study was implemented to help promote the effective disease management of students with asthma and allergic disease. Understanding teacher's current knowledge, management ability,

and educational needs regarding asthma and allergic disease will be helpful in developing intervention programs.

## II. METHODOLOGY

### A. Study Design

This study used a descriptive correlation research design to identify the relationship among overall knowledge, disease management ability, and education needs regarding asthma and allergic disease among elementary school teachers.

### B. Study Subject

The study subjects were 191 elementary schoolteachers in D city. The sample size was calculated using G\*Power 3.1.7, with an effect size of 0.3,  $\alpha = .05$ , and a power of 0.80 for a t-test. This analysis yielded a required sample size of 135. Nevertheless, we obtained a larger number to increase the generalizability of the findings.

### C. Study Variables

- Knowledge of asthma and allergic disease

Knowledge was assessed using Asthma knowledge scale that developed by Song<sup>5</sup>. It contained 20 items in total, with a total score range of 0–20; higher scores indicated a higher degree of knowledge regarding asthma and allergic disease. In Song<sup>15</sup>, the Cronbach's alpha was .66. The Cronbach's alpha of this study was .64.

- Asthma and allergic disease management ability

Participants' asthma and allergic disease management ability was assessed using Song's scale<sup>15</sup>. This scale comprises 30 items rated on a 4-point Likert scale, with higher scores indicating a greater ability to perform appropriate disease management. In Song's study<sup>15</sup>, the Cronbach's alpha was .72, while that in this study was .75.

- Asthma and allergic disease education needs

Participants' education needs regarding asthma and allergic disease was measured using Kwon and Lee's scale<sup>16</sup>, which was developed specifically for elementary schoolteachers. It comprises 12 items in subscales of general information, administration, diet, exercise, and treatment; all items were rated on a 5-point Likert, with higher scores indicating greater education needs. In this study, the Cronbach's alpha was .94.

### D. Data Analysis

We compared participants' demographics and main variables between the groups using IBM SPSS Statistics 22. The significance level was set at .05.

- We analyzed the demographic characteristic differences between the two groups using independent t-tests and chi-square tests.
- We compared the groups in terms of knowledge, management, and educational needs scores using independent t-tests.
- Pearson's correlation coefficient( $r$ ) was calculated to identify the relations among the variables in each group.

## III. FINDINGS

### Demographics between Groups

The majority of participants in both groups were women (Group 1 = 97.4%, Group 2 = 98.3%), while the most common age group was below 39 years (50% [ $n = 38$ ] in Group 1 and 40.9% [ $n = 47$ ] in Group 2). Around 61.8% and 60% of the participants in Groups 1 and 2, respectively, reported not having a religion.

Most participants in both groups were married (73.7% of Group 1 and 80% of Group 2) and had less than 16 years of education (77.6% of Group 1 and 66% of Group 2). The proportions of homeroom teachers were 51.3% in Group 1 and 48.7% in Group 2, while 43.4% and 43.5% of these groups had a teaching career of over 10 years, respectively. The proportion of participants who had experienced asthma or another allergic disease was 47.4% in Group 1 and 37.4% in Group 2. As shown in Table 1, the groups significantly differed only in their "years of education" ( $p < .05$ ).

Table 1: Participant Demographic Characteristics (N = 191)

Characteristics	Categories	Group 1(n=76)	Group 2(n=115)	t	p
		n (%)	n (%)		
Sex	Male	2 (2.6)	2(1.7)	-0.42	.675
	Female	74 (97.4)	113(98.3)		
Age, years	39 $\geq$	38(50)	47(40.9)	-1.71	.088
	40-49	26(34.2)	35(30.4)		
	50 $\leq$	12(15.8)	33(28.7)		
Religion	Have	47(61.8)	69(60.0)	0.25	.800
	None	29(38.2)	46(40.0)		
Marital Status	Married	56(73.7)	92(80.0)	-1.02	.309
	Single	20(26.3)	23(20.0)		
Years of education, years	16 $\geq$	62(77.6)	76(66.0)	-1.99	.047
	17<	14(18.7)	39(33.9)		
Responsible subjects	Health teachers	37(48.7)	59(51.3)	0.35	.725
	Homeroom teachers	39(51.3)	56(48.7)		
Teaching career, years	10 $\geq$	33(43.4)	50(43.5)	-1.56	.119
	11-20	29(38.2)	27(23.5)		
	21 $\leq$	14(18.4)	38(33.0)		
Experience of asthma/allergic disease	Yes	36(47.4)	43 (37.4)	-1.37	.172
	No	40(52.6)	72(62.6)		

Group 1: Asthma and allergic disease experienced, Group, 2: No experience asthma and allergic disease

### Comparison of Knowledge, Disease Management, and Educational Needs Scores

The mean knowledge scores for Groups 1 and 2 were 16.0 ( $\pm 1.84$ ) and 16.0 ( $\pm 2.0$ ), respectively, while the mean disease management scores were 138.2 ( $\pm 179.68$ ) in Group 1 and 130.8 ( $\pm 165.2$ ) in Group 2. The mean educational needs scores were 39.8 ( $\pm 5.75$ ) in Group 1 and 39.9 ( $\pm 5.89$ ) in Group 2. As shown in Table 2, none of the mean scores significantly differed between the groups.

Table 2: Comparison of Knowledge, Disease Management, and Educational Needs Scores

	Ranges	Group 1, M( $\pm$ SD)	Group 2, M( $\pm$ SD)	t	p
Knowledge	10-20	16.0( $\pm 1.84$ )	20.0 ( $\pm 2.0$ )	0.18	.854
Management	25-812	138.2 ( $\pm 179.68$ )	130.8 ( $\pm 165.2$ )	0.29	.770
Education needs	16-48	39.8 ( $\pm 5.75$ )	39.9 ( $\pm 5.89$ )	-0.05	.960
Characteristics	3-12	9.5 ( $\pm 1.54$ )	9.5 ( $\pm 1.72$ )	-0.15	.875
Administration	3-12	9.7 ( $\pm 1.73$ )	9.7 ( $\pm 1.85$ )	0.21	.832
Dietary	1-4	3.4 ( $\pm 0.62$ )	3.4 ( $\pm 0.56$ )	0.70	.485
Exercise	1-4	3.2 ( $\pm 0.65$ )	3.3 ( $\pm 0.63$ )	-0.57	.565
Treatment	4-16	13.7 ( $\pm 2.2$ )	13.8 ( $\pm 2.0$ )	-0.21	.829

Group 1: Asthma and allergic disease experienced, Group, 2: No experience asthma and allergic disease

### Correlation among the Variables in the Two Groups

As shown in Table 3, knowledge of asthma and allergic diseases had a significant correlation with disease management ability ( $r = .22$ ,  $p = .047$ ) and education needs( $r = .23$ ,  $p = .041$ ) in Group 1. Specifically, participants who had greater knowledge of asthma or allergic disease were more likely to have high disease

management and educational needs. However, there were no significant correlations among knowledge, disease management, and educational needs in Group 2.

Table 3: Correlations among the Variables

Group	Categories	1) r(p)	2) r(p)	3) r(p)	4) r(p)	5) r(p)	6) r(p)	7) r(p)
Group 1	Knowledge <sup>1)</sup>	1						
	Management <sup>2)</sup>	.22(.047)	1					
	Educational needs <sup>3)</sup>	.23(.041)	-.09(.408)	1				
	General information <sup>4)</sup>	.18(.118)	.01(.871)	.75(<.001)	1			
	Administration <sup>5)</sup>	.23(.038)	-.08(.490)	.87(<.001)	.50(<.001)	1		
	Dietary <sup>6)</sup>	.16(.158)	-.10(.391)	.86(<.001)	.52(<.001)	.71(<.001)	1	
	Exercise <sup>7)</sup>	.17(.126)	-.04(.719)	.73(<.001)	.53(<.001)	.54(<.001)	.66(<.001)	1
	Treatment <sup>8)</sup>	.20(.082)	-.16(.167)	.93(<.001)	.55(<.001)	.76(<.001)	.85(<.001)	.63(<.001)
Group 2	Knowledge <sup>1)</sup>	1						
	Management <sup>2)</sup>	.13(.151)	1					
	Educational needs <sup>3)</sup>	-.05(.541)	.01(.846)	1				
	General information <sup>4)</sup>	-.08(.377)	-.01(.882)	.87(<.001)	1			
	Administration <sup>5)</sup>	-.02(.764)	.02(.784)	.90(<.001)	.73(<.001)	1		
	Dietary <sup>6)</sup>	.00(.952)	-.01(.898)	.80(<.001)	.65(<.001)	.66(<.001)	1	
	Exercise <sup>7)</sup>	-.07(.417)	-.12(.193)	.75(<.001)	.61(<.001)	.64(<.001)	.60(<.001)	1
	Treatment <sup>8)</sup>	-.04(.606)	.08(.380)	.88(<.001)	.64(<.001)	.70(<.001)	.72(<.001)	.59(<.001)
Group 1: Asthma and allergic disease experienced, Group, 2: No experience asthma and allergic disease								

#### IV. DISCUSSION AND CONCLUSION

This study examined elementary school teachers' knowledge, disease management ability, and education needs concerning asthma and allergic diseases, with the aim of benefiting the development of in-school education programs for teachers. The results indicated a significant correlation between all three variables among teachers who had prior experiences with these diseases. Furthermore, teachers in this experience group tended to have more disease-related knowledge and educational needs. Generally, elementary school students spend a considerable amount of time in school under the guidance of individual teachers. If a student suffers an asthma attack, it may be necessary for his or her teacher to provide assistance, and thus teachers who have the ability to manage the disease will be of greater help in rescuing students at risk for such attacks<sup>19,20</sup>. However, many teachers have little knowledge of asthma and allergic disease, as they lack the opportunity to obtain even a general knowledge of this topic<sup>21,22</sup>. Some teachers have expressed fears concerning whether they have received sufficient training for handling an emergency situation<sup>21</sup>. Appropriately tailored education based on teachers' experience may enable better outcomes. In particular, teachers must be trained in disease management of students with asthma because asthma attacks and other severe allergic reactions (e.g., respiratory distress) can occur suddenly and often cannot wait for health teachers' care. According to a previous survey, only 1% of teachers obtain relevant knowledge on allergic disease through experience of students with asthma/allergic symptoms, whereas around 9.6% may obtain such knowledge through school records<sup>23,24</sup>. For teachers to intervene in asthma attacks or allergic reactions appropriately, they must obtain sufficient knowledge and disease management ability.

Surprisingly, the disease-related knowledge of teachers without experience of asthma and allergic disease was higher than that of teachers with such experience, but this knowledge was not correlated with disease management ability. Moreover, the educational needs scores of this group did not correlate with either the knowledge or the disease management scores. In other words, teachers without experience of asthma and allergic disease should be provided with education to enhance their awareness of the importance of asthma and allergic disease. In contrast, teachers who have experienced these diseases should be provided with a support program tailored to their level of knowledge. In a study by Woo and Park<sup>25</sup>, the effect of elementary school students was found to be influenced by the support of friends, family, and teachers; this suggests that support from schoolteachers may help promote positive emotional changes among students with asthma and allergic diseases, which in turn can aid in disease management. In summary, tailored education and training based on teachers' educational needs and knowledge may help them support their students with

asthma/allergic disease. This is likely to be especially beneficial to students at high risk of asthma attacks or allergic reactions<sup>26</sup>.

Various programs aimed at elementary school teachers' knowledge and disease management ability related to asthma and allergic diseases and tailored to their individual needs are needed for effective symptom management.

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## A Study on Characteristics of Toll Nonpayment Associated with Expressway High-pass

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### Abstract---

**Background/Objectives:** The expressway toll violation and non-payment has been increasing with the wide use of High pass System. Thus, the present study analyzed the data published in 2015 to characterize the toll non-payment trend associated with the High pass System. **Methods/Statistical analysis:** The sample analyzed here included the vehicles that used expressways without paying tolls in 2015. 7,755,042 vehicles failed to pay tolls in 2015. For the analysis, Excel and statistics S/W package SPSS 19 were used.

**Findings:** This finding suggests that the toll nonpayment is attributable to communication errors between devices from different manufacturers, traffic volumes and vehicle types.

**Application/Improvements:** To adopt the smart tolling system, a nonstop multi-lane free-flow ETCS, where vehicles fitted with High pass terminals pay tolls automatically as they do now while those without such terminals have their license plates recognized by some video devices for automatic tolling, the information collected by the existing High pass lane controllers need be specified further so that devices causing problems can be determined with ease. In addition, some remote-control features need be employed for an efficient maintenance approach.

**Keywords---** Expressway, High Pass System, Toll Violation, Characteristics of Toll Nonpayment, Smart Tolling System.

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## I. INTRODUCTION

Since December 2007, when the expressway High pass System was first installed across the country, the toll payment on the convenient and fast High pass lanes has increased every year. Specifically, the use of High pass lanes increased by 28.7% in 2015 compared with 2013, whereas the toll violation associated with High pass cards surged by 41.5%, outpacing the penetration rate of the cards. High pass Cards are sub-divided into prepaid and post-paid ones. As in Table 1, the toll violation associated with post-paid High pass cards increased by 5.5% and 5.0% in 2015 and 2013, respectively, given the traffic volume.

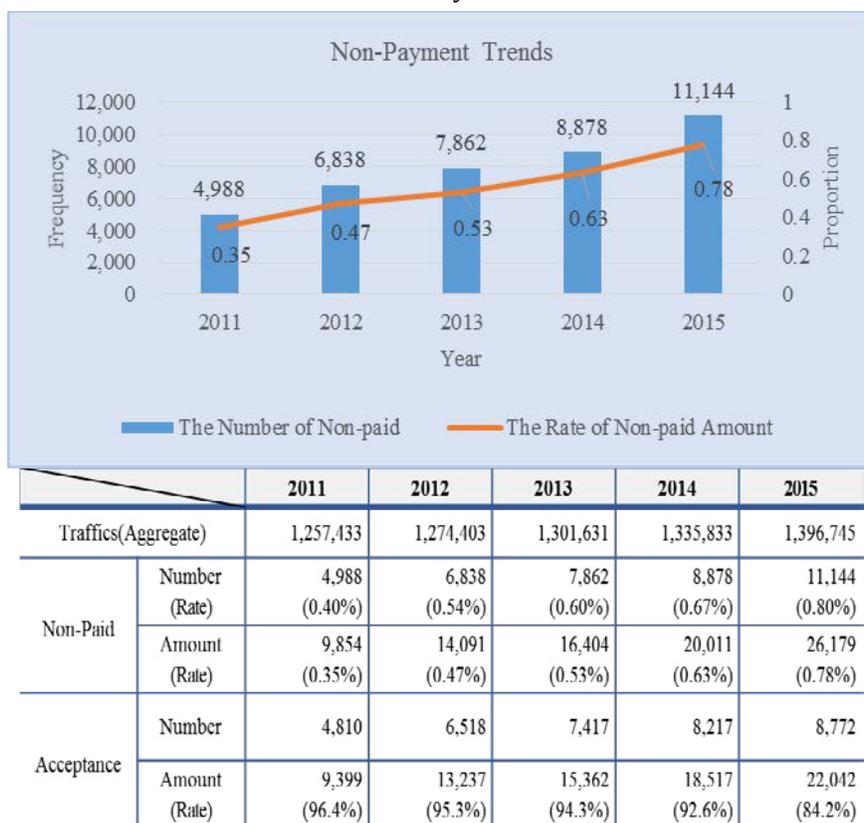
Table 1: Highpass Postpaid Card Violation Trend  
(Unit : Thousand/Day,%)



The toll nonpayment associated with High pass cards accounted for 98% minimum of all toll violations in 2015. As in Table 2, the toll nonpayment grew every year, i.e.

0.14%P('12)→0.06%P('13)→0.07%P('14)→0.13P('15).

Table 2: Non-Payment Trends



(Unit : Thousand, \Million)

## II. THEORETICAL BACKGROUND

The High pass System refers to Korea's sun attended ETCS (Electronic Toll Collection System) on expressways, comprised of Vehicle Classification System, Vehicle Violation Shooting Equipment, Antenna, Drive Controller, Breaker, Drivers Indicators and Vehicle Detection Device as shown in Figure 1.

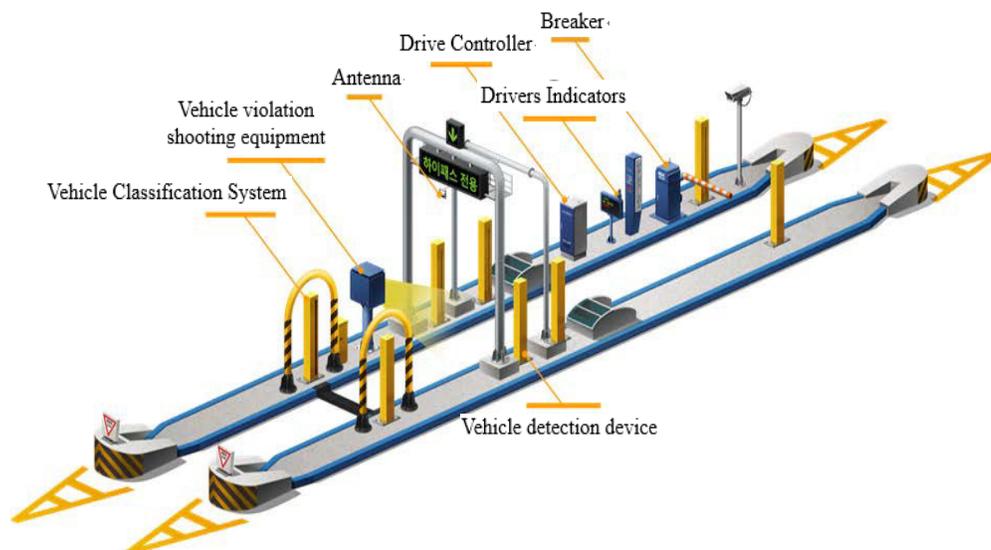


Figure 1: Highpass System Schematic Diagram

The High pass ETC system is an IR-RF integrated system with the DSRC communication method applied based on the characteristics of each toll booth. The toll collection system is sub-divided into open and close systems, and the lanes into High pass-only and hybrid lanes where both High pass cards and TCS (Toll Collection System) are available.

The entire High pass System consists of the headquarters server, toll booth, lane equipment and vehicle-mounted device. The vehicle-mounted device consists of a High pass terminal (OBU, On Board Unit) and an electronic card, which communicate with the High pass lane equipment for toll settlement. The lane equipment involves the vehicle classification system, vehicle detection device, wireless communication unit, vehicle violation shooting equipment, breaker system unit and driver indicator, LED board, signal lamp and integrated lane controller that controls the tolling process by communicating with the foregoing components via the interface.

Kim H. J. (2015) classified the toll collection procedure of the High pass System largely into the Wake-up, Downlink, Transaction, Detection and Out Zones as shown in Figure 2. In the Wake-up Zone, the vehicle-mounted terminal starts upon receiving the wake-up signal. The electronic card in the terminal generates the signature value 1. In the Downlink Zone, the terminal includes the signature value 1 generated by the electronic card and the BST (Beacon Service Table) value received from the antenna controller in the VST information. In the Transaction Zone, the antenna controller puts the signature value 1 in the lane controller's purchase secure application module (PSAM), verifies it and generates the signature value 2. At the same time, the antenna controller uses the terminal's entry information to calculate the toll and checks the Black List. When the antenna controller requests the terminal for the calculated toll, the electronic card verifies the signature value 2, pays the toll and generates the signature value 3, which is in turn verified by the lane controller's PSAM. Then, the antenna controller requests the terminal and electronic card to record the exit (present) information. In the vehicle detection zone, the vehicle violation shooting equipment determines the violation status of the vehicle and decides whether to capture its license plate or not. At the same time, the terminal switches to the Buzzer & Sleep mode, and the electronic card records the exit information. In the Out Zone, the final result is summarized and transmitted to the toll booth computer, followed by the notification that the toll collection process for the vehicle is completed.

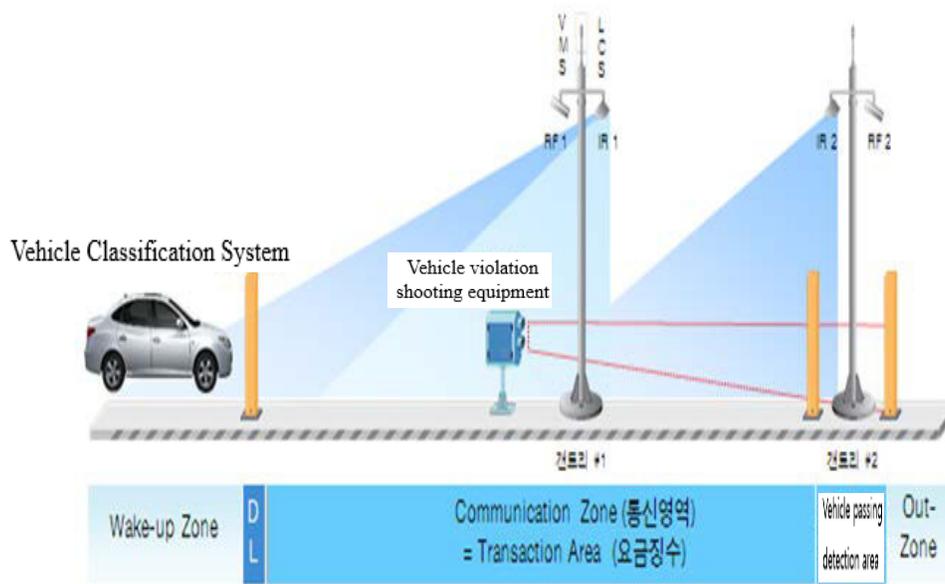


Figure 2: Highpass toll Collection Process

### III. RESEARCH MODEL

As in Figure 3, vehicles are classified into normal and violation types. The violation vehicles are sub-classified into pay and nonpayment vehicles. The nonpayment is sub-classified into general (equipment error and personal negligence) and deliberation.

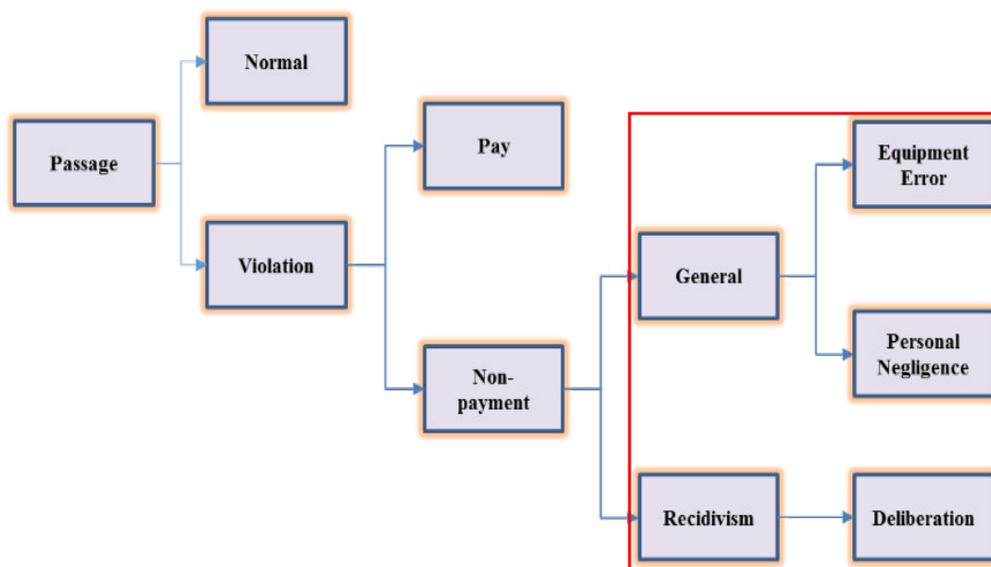


Figure 3: Research Model

Hence, the present study characterized the non-payment vehicles among other toll violators.

Question1. At which IC does the toll nonpayment occur most frequently?

Question2. What time of day does the toll nonpayment occur most frequently?

Question3. What types of vehicles are most frequently associated with the toll nonpayment?

Question4. Which combination of lane equipment and terminal(OBU) is most frequently associated with the toll nonpayment?

#### IV. METHOD

The sample analyzed here included the vehicles that used expressways without paying tolls in 2015. 7,755,042 vehicles failed to pay tolls in 2015. For the analysis, Excel and statistics S/W package SPSS 19 were used. The number of violations outlined in Table 3 implies that the devices became outdated over time since the adoption of the High pass lanes in each region, which was regarded as a control variable and not considered in the analysis.

Table 3: Number of Toll Nonpayment by the Year of Highpass Opening

Year of opening	The Number of non-payment
2005	1082055
2006	830188
2007	2516003
2008	715834
2009	538210
2010	412354
2011	296178
2012	445509
2013	218295
2014	452925
2015	247491
Total	7,755,042

#### V. EMPIRICAL ANALYSIS AND VERIFICATION

First, Table 4 shows the number of toll nonpayment at each IC(interchange) in 2015. Guri IC had the highest frequency of toll nonpayment followed by Kimpo and Incheon in the order named. In other words, vehicles failed to pay tolls mostly in the capital region.

Table 4: Toll Nonpayment by IC

IC	Frequency	Proportion
Guri	566235	0.072746
Kimpo	529320	0.068004
Incheon	400691	0.051478
Siheung	397601	0.051081
ChungGye	366308	0.047061
Sungnam	362817	0.046612
Seoul	273882	0.035187
Seoseoul	252123	0.032391
Pangyo	237823	0.030554
Namincheon	187359	0.024071
Dongseoul	167577	0.021529
Gunja	126039	0.016193
Singal	110237	0.014163
Dongsuwon	96737	0.012428
Hanam	85886	0.011034
Daedong	81425	0.010461
Seoansan	81222	0.010435

Therefore, regarding the hypothesis1 (At which IC does the toll nonpayment occur most frequently?), the toll nonpayment occurred mainly at ICs in the capital region.

Next, as for the analysis of the time of day when the toll nonpayment occurred most frequently, the curvilinear regression analysis found the coefficient of determination  $R^2=0.904$ . Also, the p was 0.973, 0.002 and 0.000 based on the linear, quadratic and cubic regression equations, respectively, indicating the cubic regression equation proved to be a fit model as table 5.

Table 5: Regression Result on Time and the number of Non-Payment

Model Summary

R	R <sup>2</sup>	Adj. R <sup>2</sup>	Estimated SE
0.951	0.904	0.890	54390.671

Independent variable: Time

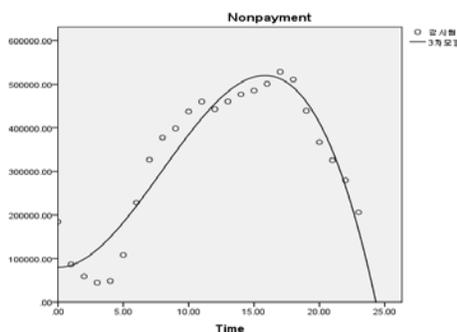
ANOVA

Model	Sum of Square	df	Avg. square	F	p
Regression Model	5.579E11	3	1.860E11	62.857	0.000 <sup>a</sup>
Residual	5.917E10	20	2.958E9		
Total	6.170E11	23			

Independent variable: Time

Coefficient

	Non Standardized Coefficient		Standardized Coefficient	t	p
	B	SE	$\beta$		
Time	-498.053	14728.218	-0.022	-0.034	0.973
Time**2	5333.536	1506.758	5.483	3.540	0.002
Time**3	-223.996	43.020	-5.116	-5.207	0.000
Constant	80103.867	38284.295		2.092	0.049



Regarding the hypothesis2(What time of day does the toll nonpayment occur most frequently?), the toll nonpayment gradually increased during the morning rush hour and reached a peak during the evening rush hour (i.e., at 5 p.m.).

The Korea Expressway Corporation classified the vehicles using expressways into five types, i.e., the 1st-class (2axles with the tire width of 279.4mm or less), the 2nd-class(2axles with the tire width of over 279.4mm and the tread width of 1800mm or less),the 3rd-class (the tire width of over 279.4mm and the tread width of over 1800mm), the 4th-class(3axles), and the 5th-class vehicles (more than 4axles).The toll nonpayment per vehicle type was analyzed as below table 6.

Table 6: Toll Nonpayment Per Vehicle Type

Type	car.freq.	car.prop.
1	7389517	0.949401
2	127865	0.016428
3	164825	0.021177
4	11951	0.001535
5	11409	0.001466

Thus, as for the hypothesis 3 (What types of vehicles are most frequently associated with the toll nonpayment?), the 2-axle vehicles with the tire width of 279.4mm or less(the 1st class vehicles) accounted for 94.9% of all toll non-payments, surpassing all the other types of vehicles.

Finally, the frequency of toll nonpayment was analyzed in terms of the lane equipment and vehicle terminals (OBU). The High pass System is comprised of the CCU centrally controlling the lanes, the

IR (Infrared Ray) antenna, and the RF(Radio Frequency) antenna, which communicate with the personal High pass terminals(OBU) to collect tolls. At present, the CCUs, IR antennas and RF antennas installed on express ways nationwide are manufactured by 6 companies each. The personal terminals are manufactured by more than 140 companies. Thus, the combination of the High pass System components and the personal terminals was analyzed to determine the highest frequency of toll nonpayment. As a result, the combination of the CCU from Straffice, the IR antenna from Straffice and the RF antenna from Seotong and the terminal from Mpion led to the highest frequency of toll nonpayment as in Table 7.

Table 7: Toll Nonpayment Per Highpass System Component Manufacturer

CCU	IR_ANTNA	RF_ANTNA	obu	NonPayment
Straffice	Straffice	Seotong	Mpion	493709
Seotong	Straffice	Seotong	Mpion	372546
DB	DB	DB	Mpion	347776
Posco	AITS	Seotong	Mpion	242202
DB	AITS	Seotong	Mpion	225266
Posco	Posco	Posco	Mpion	206266
LS	LS	LS	Mpion	199520
Straffice	Straffice	Seotong	Mobis	182532
iTronics	iTronics	iTronics	Mpion	180867
DB	AITS	DB	Mpion	165026
DB	DB	Seotong	Mpion	134662
Seotong	Straffice	Seotong	Mobis	134084
Posco	AITS	Highgain	Mpion	128852
DB	DB	DB	Mobis	124110
Straffice	Straffice	Seotong	SDSystem	102844
Straffice	Straffice	Seotong	AITS	100479

Hence, regarding the hypothesis4(Which combination of lane equipment and terminal (OBU) is most frequently associated with the toll nonpayment?), the CCU from Straffice, the IR antenna from Straffice, the RF antenna from Seotong, and the terminal from Mpion were associated with the toll nonpayment most frequently. That is, the combination of Straffice, Straffice, Seotong and Mpion was most prone to the toll nonpayment.

## VI. CONCLUSION

As K. MuraliSiva(2015)2pointed out the efficiency, despite the increasing use of the convenient and fast expressway High pass System, chronic traffic congestion takes place once vehicles pass the toll booths whilst the cases of toll nonpayment are increasing at the same time. Thus, the present study analyzed the characteristics of express way toll nonpayment in 2015 with a view to improving the efficiency of the High pass System. The analysis highlighted that the 1st-class vehicles failed to pay tolls most frequently at ICs in the capital region during the evening rush hour. Also, the combination of lane equipment and terminal manufactured by Straffice, Straffice, Seotong and Mpion led to the most frequent toll nonpayment. This finding suggests that the toll nonpayment is attributable to communication errors between devices from different manufacturers, traffic volumes and vehicle types. To adopt the smart tolling system, a nonstop multi-lane free-flow ETCS, where vehicles fitted with High pass terminals pay tolls automatically as they do now while those without such terminals have their license plates recognized by some video devices for automatic tolling, the information collected by the existing High pass lane controllers need be specified further so that devices causing problems can be determined with ease. In addition, some remote-control features need be employed for an efficient maintenance approach.

## ACKNOWLEDGMENT

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# The Mediating Effects of Depression on Self-Esteem and Eating Attitude of Female College Students

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## Abstract---

**Background/Objective:** This research aim to figure out the mediating effect of depression on the association between self-esteem and eating attitude among female college students.

**Methods/Statistical analysis:** The data was collected from 124 female college students in Korea. To find out the mediating effect of depression, 3 steps mediation process model was used for analysis. The instrument used EAT-26 for eating attitude, BDI for depression, and Rosenberg's self-esteem scales. Pearson's correlation coefficient and regression analyses were used to analyze the data using SPSS 23.

**Findings:** The self-esteem had a significant effect on depression ( $\beta = -.53$ ,  $p < .001$ ) in the first step, and had a significant effect on eating attitude ( $\beta = -.21$ ,  $p < .05$ ) in the second step. Finally in the third step, the self-esteem showed no significant effect on eating attitude and  $\beta$  value was decreased than the second step ( $\beta = .03$ ,  $p < .05$ ) when the depression is mediated. As a result, it has shown that the depression was found to have fully mediating effect between self-esteem and eating attitude.

**Improvements/Applications:** The preventive intervention program related to improve self-esteem and possibly lower depression is required to prevent developing poor eating attitude.

**Keywords---** Self-Esteem, Depression, Eating Attitude, Weight Control Behavior, Anorexia Nervosa, Bulimia.

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## I. INTRODUCTION

Recently, due to the influence of TV or mass media that thin and skinny body shape is considered as the standard of beauty and more attractive, many young women want to be thinner and skinnier even though they are within normal range<sup>1</sup>. Most of them think that the appearance or the way that someone looks is the most important criteria for an individual's wealth and successes, people with appeared beauty have more self-satisfaction and self-esteem<sup>2</sup>. According to the atmosphere of current society, even women with normal weight and body mass index(BMI) try to lose weight to maintain skinny body shape and usually think that they are overweight even though they have lower weight than the normal<sup>3</sup>. For those reasons, many women have tried various weight control behaviors including unhealthy method using diuretics and forced fasting<sup>4,5</sup>.

Actually, recent lots of research shows that many women evaluate themselves overweight or obese even though they have normal or lower in BMI and over half of them are dissatisfied with their body shape<sup>3,6</sup>. For the case of dissatisfaction with own body shape, they tend to have negative feeling like depression and lower self-esteem<sup>7</sup>. For example, the students who considered themselves obese have the tendency to develop depression as comparing with standard weight and adolescents doing weight control behavior show more depressive compared with the otherwise<sup>8</sup>. The negative emotion of depression tends to cause abnormal eating attitude and patients with eating disorder are more common to have high level depression in simultaneous<sup>9-11</sup>.

Eating disorder is usually classified as anorexia nervosa and bulimia nervosa. Both of them are related to fear of weight gain and desire for weight loss that have possibility to bring body dissatisfaction and abnormal eating attitude<sup>12</sup>. It was found that 80% of eating disorder is caused by abnormal eating attitude including forced weight control behavior.

Based on the report, eating disorder mainly the problem of teenagers and young adults aged of 18 and 25 in emotional, social and physical aspects<sup>4</sup>. Especially, women during these periods easily gain fat in their body due to developing of physical body and it makes them to do behavior related to eating disorder as socio-cultural tendency that skinny body is ideal beauty<sup>13</sup>. Therefore, it is interesting to look into the effect of depression on eating attitude among these age groups.

The eating attitude also closely is related to lower self-esteem. In other words, women with lower self-esteem easily tend to have eating disorder and some of researches explain that lower self-esteem is important part of abnormal eating attitude and behavior<sup>1,14</sup>.

Thus, the lower self-esteem if mediated by depression might affect eating attitude of the students and they are closely have a reciprocal relationship, which means women with lower self-esteem and dissatisfaction on their body have the tendency to develop depression and it could be powerful factor to have an effect on abnormal eating attitude. This paper aimed to determine the mediating effect of depression on the association between self-esteem and eating attitude. As a researcher, I wanted to provide evidence about program development of eating disorder prevention vis-a-vis analysis of relationship among eating attitude, self-esteem, and depression among female college students.

## II. METHODOLOGY

### A. Research Design & Model

The mediating effect was analyzed with based on 3 step procedures<sup>15</sup>. From literature review, self-esteem is the independent variable, depression placed as the mediator and eating attitude is the dependent(outcome) variable. The conceptual model is shown in Figure 1.

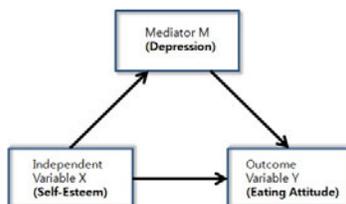


Figure 1: The Research Model

To identify the mediating effect, procedure was followed using 3 steps. In the first step, it has to be confirmed that the independent variable would be a significant predictor of the dependent variable. In the second step, it has to be confirmed that the independent variable would be a significant predictor of the mediator. In the third step, those are confirmed that the mediator is a significant predictor of the dependent variable, and the previously significant independent variable in the first step has been greatly reduced (partial mediation) or if not significant (full mediation) when the mediator is inserted to the relationship between two major variables.

**B. Subjects and Data Collection**

The 124 female college students aged 18 and 24 years old participated in this survey. The structured questionnaire was distributed to 126 students, however, 2 copies were excluded from final analysis. To complete the questionnaire, the students took 10-15 minutes. The informed consent and confidentiality were observed throughout the research process, where the students have the freedom to withdraw and refuse at anytime of the survey.

**C. Statistical Method**

To identify the relationship among self-esteem, depression and eating attitude, Pearson’s correlation coefficient was used. To figure out the mediating effect of depression on the association self-esteem and eating attitude, regression analyses were used using SPSS 23. Sobel’s test<sup>16</sup> was performed to determine if the relationship between the independent variable and dependent variable has been significantly reduced when mediator insert between two variables.

**D. Survey Tools**

**Eating Attitude Test-26 (Garner, Olmsted, Bohr &Garfinkel, 1982)**

The eating Attitude Test-26(EAT-26), by<sup>17</sup>, is composed of a 26-item standardized self-report measure of sign and symptoms of eating disorders<sup>17</sup>. Higher score means worse eating attitude, wherein scores over 20, is considered the possibility of having anorexia nervosa as judged by pathological eating behavior<sup>17,18</sup>. This screening tool has been useful in assessing “eating disorder risk” in young age group such as high school, college and other special risk groups. The EAT-26 is rated on a six-point Likert scale(always, usually, oftentimes, sometimes, rarely, and never), which based on how often the individual immerse in specific behaviors. The reliability of this tool is.94<sup>18</sup>. The reliability of this study is shown in Table 1.

Table 1: The Reliability of Tool

Tool	The number of items	Cronbach’s alpha	
EAT-26	Anorexia -13 items	.81	.76
	Binge and commitment to food – 6 items	.75	
	Eating control – 7 items	.71	
Self-Esteem	10 items		.84
BDI	21 items		.91

**Self-Esteem: Reosenberg (1965)**

The self-esteem reflects a person’s overall subjection emotional evaluation of his or her own worth and this measurement tool was created by<sup>19</sup>. This scale consisted of 5-positive and 5-negative items with 5 point Likert scale. The higher score means better self-esteem. This tool was reliable at Cronbach’s alpha = .80 on <sup>1</sup> and.84 in this study(Table 1).

**Depression: Beck (1961)**

Depression is consistently feeling a state of hopelessness, instability, sadness and despair. It is a state of low mood and the other way to activity which has an effect on the person’s thought, action, emotions and well-being<sup>20</sup>. In this study, a state of depression was collected by depression inventory<sup>21</sup>. The tool is consisted of 21 items including physiological, emotional, cognitional and motivational symptoms areas with self-reported questionnaire. Beck is classified depression with normal(0-9 scores), mild depression(10-15 scores), depression(16-23 scores) and major depression(24-63 scores). The reliability of study(1981)<sup>22</sup> was Cronbach’s alpha = .85. The instrument was reliable at Cronbach’s alpha= .91(Table 1).

### III. RESULT OF STUDY

#### A. General Characteristics

The general characteristics of participants are shown in Table 2. It was found that the average body weight of 124 candidates was 53.6 kg and average BMI was 20.5. Both of them were within standard weight 55.4Kg and normal BMI(18.5-24.9).

In the awareness of own body weight, 54 students(51.6%) responded that they think that they are obese or overweight. In the trial of weight control, 46 students( 37.1%) are on a diet now and oftentimes, 88 of the students (71%)have been tried to go on a diet. The difference of the ideal weight and current weight was average -5.2Kg. The BMI as calculated on body weight and height was classified by the underweight group(20 students, 16.1%), normal group(94 students, 75.8%) and only 10 students(8%) were belonged to the group of overweight or mild obese. In the eating attitude result, pathological eating attitude group, over 20 scores, was found to 22 students(17.3%) and the others 102 students were belonged to the normal group. The average of depression score was 9 and specific group was divided as Table 2.

Table 2: The General Characteristics

Variables	Classification	n	%	M(SD)
Awareness of own body weight	Underweight	8	6.5	
	Average	52	41.9	
	Overweight	60	48.4	
	Excessive overweight	4	3.2	
The enforced weight control now or not	No	78	62.9	
	Yes	46	37.1	
The current body weight(Kg)				53.6(7.1)
The ideal body weight(Kg)				48.4(5.6)
The difference of current body weight and ideal body weight(Kg)				-5.2(4.4)
BMI(Body Mass Index)	Underweight group	20	16.1	
	Normal group	94	75.8	
	Overweight group	4	3.2	
	Mild obese group	6	4.8	
	Obese group	0	0	
The eating attitude	Normal group	102	82.3	12.13(9.4)
	Abnormal group	22	17.3	
The depression scores	Normal	74	59.7	9(7.4)
	Mild depression	28	22.6	
	Depression	17	13.7	
	Major depression	5	4	
The self-esteem				12.12(6.2)

#### B. Pathological Eating Behavior of Subjects

To verify pathological eating behavior, 5 questions were asked subjects in Table 3. A remarkable result was found that even small students responded for "2 to 6 times every week" or "once every day or more" which mean that those behaviors require some treatment or intervention for eating disorder.

Table 3: The Pathological Behavioral Eating Attitude of Subjects

Eating Behavior	Classification N(%)					
	Never	Once a month or less	2-3 times a month	Once a week	2-6 times a week	Once a day or more
Gone on eating binges where you feel that you may not be able to stop?	39 (31.35)	34 (27.4)	37 (29.8)	7 (5.6)	5 (4)	2 (1.6)
Ever made yourself vomited to control your weight or shape?	99 (79.8)	14 (11.3)	5 (4)	5 (4)	0	1 (.8)
Ever used laxatives, diet pills or diuretics(water pills) to control your weight or shape?	81 (65.3)	16 (12.9)	17 (13.7)	8 (6.5)	1 (.8)	1 (.8)
Have you ever been treated for an eating disorder?	112 (90.3)	8 (6.5)	2 (1.6)	2 (1.6)	0	0
Have you ever been tried suicidal attempt or thought about it?	108 (87.1)	9 (7.3)	3 (2.4)	4 (3.2)	0	0

**C. Correlation between Self-Esteem, Depression and Eating Attitude**

The correlation between self-esteem, depression and eating attitude is shown in Table 4. The self-esteem has moderate negative correlation ( $r=-.53, p<.01$ ) with depression. The self-esteem has lower negative correlation effect( $r=-.21, p<.05$ ). The depression has lower positive correlation( $r=.36, p<.01$ ) with eating attitude.

Table 4: The Correlation of Self-esteem, Depression and Eating Attitude

Variable	Self-esteem	Depression	Eating Attitude	Average	SD
Self-esteem	1			12.12	6.2
Depression	-.529**	1		9	7.4
Eating Attitude	-.210*	.361**	1	12.13	9.4

\* $p<.05$ , \*\* $p<.01$

**D. Analysis of Research Model**

The tolerance limit of each regression expression was .72 and over 1 and VIF(Variance Inflation Factor) was 1.39 and under 10. It was turned out that there was no problem of multi collinearity among all variables. Durbin-Watson coefficient was 1.87 and closed to 2. It was verified that there was no correlation among residual variables. The mediating effect of depression on the association between self-esteem and eating attitude in female college students group is shown in Table 5. During the first step independent variable, self-esteem has an effect on mediator, depression, and was statistically significant ( $\beta=-.53, p<.001$ ). The second step, independent variable, self-esteem was also found to have a direct effect on outcome variable, eating attitude was statistically significant ( $\beta=-.21, p<.05$ ). In the third step, the effect on self-esteem and eating attitude has decreased than that of the 2<sup>nd</sup> step ( $\beta=-.03$ ), it was not significant in statistic( $p>.05$ ). Finding has shown that depression was found to have fully mediating effect on the relationship between self-esteem and eating attitude. The Sobel test show statistically significant mediating effect of depression ( $Z=3.63, p<.001$ ).

Table 5: The Mediating Effect of Depression on the Association between Self-Esteem and Eating Attitude

Step	Variable	$\beta$	R <sup>2</sup>	F
1. Independent V.→Mediator	Self-esteem→Depression	-.53***	.28	47.32***
2. Independent V.→ Dependent V.	Self-esteem→Eating Attitude	-.21*	.04	5.64**
3.Independent V.→Dependent V. Mediator→Dependent V.	Self-esteem→ Eating Attitude Depression→Eating Attitude	-.03 .35*	.13	9.11***

**IV. CONCLUSION & DISCUSSION**

The research examined the mediating effect of depression on the association between self-esteem and eating attitude from 124 female college students and the conclusion was followed by below.

First, the average body weight of subjects, over half of them (53.6 kg) did not reach to the standard body weight(55.4Kg), 64 students(51.1%) recognize them overweight than normal even though their average BMI was 20. 5 within normal range. The result reflect current climate of society that prefer skinny and thin body and consider that as beauty. The fact that only 8 percent(10 students) were overweight or mild obese, whereas the majority (92 percent) were all in underweight or normal group. This result corresponded with the previous studies that female in normal group evaluate them as overweight or obese compared with objective BMI <sup>3, 6, 23</sup>. In Kong’s stud<sup>8</sup>, the result that 80% of eating disorder was caused by enforced weight control behavior imply that the subjects of this study were exposed with eating disorder thoroughly. The preventive education program related to eating habit and weight control behavior is required before developing to eating disorder.

Second, in the correlation among self-esteem, depression and eating attitude, the self-esteem has moderate negative correlation ( $r=-.53, p<.01$ ) with depression. Self-esteem has lower negative correlation effect( $r=-.21, p<.05$ ). The depression has lower positive correlation( $r=.36, p<.01$ ) with eating attitude. The result implied that the more self-esteem, the less depression, while the lower self-esteem will lead to more depression which causes more abnormal eating attitude. This result is corresponded with research(2004)<sup>4</sup> that the group that perform weight control showed more depression compared with not doing group and depression has positive correlation with eating disorder symptoms. Besides, it is corresponded with results of previous studies that the group that recognize them obese with lower self-esteem has more depression and the rate of depression at the same time among people with anorexia nervosa was 35-85% and patients with

bulimia shows high scores in depression and anxiety<sup>8</sup>. From above the results, it is presumed that depression is related to eating disorder in close and depression symptoms is needed to be treated in advance and countermeasure is needed to be prepared before depression is developed to eating disorder.

Third, it is turned out that depression has fully mediating effect on the association between self-esteem and eating attitude. Namely, self-esteem affected to eating attitude when the depression is mediated to the association of self-esteem and eating attitude but self-esteem did not have a direct effect to eating attitude. This result was not corresponded with the previous studies that women with lower self-esteem mainly have eating disorder and lower self-esteem is an important part of abnormal eating attitude and behavior<sup>1,14</sup>. That result implies that there is some possibility to overlook the mediation effect of depression on the association between the self-esteem and eating attitude. Further studies are required to identify the mediation effect of depression and other variables to be able to affect to the association between those variables.

In this study, it can be concluded that women with lower self-esteem tend to have more depressive mood which easily cause abnormal eating attitude. In addition, Korean female college students have the tendency to distort them to more obese than real body shape and the countermeasure is much needed in preparing in recognizing their body shape in right way. The enforce weight control behavior causes severe eating disorder and it also is closely related to depressive disorder. Therefore, the intervention that prevent from depression is very much needed to be designed in order to prevent eating disorder. In other words, the result of this research implies the therapeutic intervention to deal with depression and to increase self-esteem should be formulated to reduce abnormal eating attitude leading eating disorder. Additional research is required about various causes of eating attitude with using stepwise regression to find out various mediating variables.

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# Influence of College Student' Leadership Behavior Characteristics on Organizational Citizenship Behavior: Moderating Effect of Self-Efficacy

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## Abstract---

**Background/Objectives:** This study is one on the effect of leadership behavior characteristics in Korea and China on organizational citizenship behavior by means of moderating effect of self-efficacy.

**Methods/Statistical analysis:** This study conducted analysis using PLS as methodology. PLS much used for exploratory research is a method largely used for the initial stage of developing research model. This study also used moderating effect, which means the second independent variable considered to make contingent effect or moderating effect in the relations between independent of dependent variables.

**Findings:** This study conducted analysis on the effect of leadership behavior characteristics in Korea and China on organizational citizenship behavior. It was found in both Korea and China that leadership behavior characteristics makes positive influence on organizational citizenship behavior but without moderating effect of self-efficacy. Leadership behavior characteristics meaning those intended for leader includes creativity, goal-setting ability, challenge spirit, communication skill and problem solving ability. Leader should use such behavior characteristics and nurture capability to organizational citizenship behavior, a voluntary participation behavior.

**Improvements/Applications:** Results of this study could be practically used in educational institutions in charge of leadership training, besides college students, and help seeking for direction to nurture basic attainments on leader's behavior characteristics.

**Keywords---** Leadership, Leadership Behavior, Leadership Behavior Characteristics, Organization Citizenship Behavior, Self-Efficacy.

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## **I. INTRODUCTION**

Recently, leadership is explained as a universal personal trait rather than ability restricted to leaders of specific areas. It is because, to lead numerous groups including public and private organizations and family, leaders' role becomes important in all areas regardless of specific areas. To improve leadership in line with such epochal change, systematic education should be made on it from elementary, middle and high schools<sup>1,2</sup>.

Currently, at colleges, diverse education is carrying on to foster leadership and its theory as required subject for culture. Unlike the past, leadership is important to college students because success of future organizations depends on leaders and college education is the actual site for making such leaders-to-be.

From perspective of development in one's whole life, life in college can be an important period of adaptation in which a person experiences the process of the biggest change for life. Through experience of college life, students must establish a new lifestyle and acquire the abilities to deal with many problems confronting them – psychological, social and personal – actively on their own<sup>3-5</sup>.

During college life, they can have diverse experiences such as circle, small group, student union, supporters, etc. They also can take initiative ahead of others through such experience and build ability to help others outside their business.

What can there be ways for college students to build organizational citizenship behavior?<sup>6</sup> It is organizational citizenship behavior that allows them to help other colleagues, perform things outside one's duty voluntarily, make more efforts required for organizational development and conduct themselves carefully responding positively to an organization's matters of interest<sup>7</sup>. Kang<sup>8</sup> said that voluntary activity of an organization's member or general citizens enhances the propensity of organizational citizenship behavior positively. This suggests a need to investigate the relationship between college students' leadership behavior characteristics and organizational citizenship behavior.

Students need not just achievement of schoolwork but also establishment of firm values, autonomous and rational decision-making, acquisition of behavioral style and ability to form broader and diverse personal relations.

Besides, an enterprise must employ talents it needs from college and college must endeavor to cultivate talents suited for demands of enterprise<sup>5</sup>.

Foregoing studies related to leadership largely deal with business employees, most of which are ones on leadership and job satisfaction, service quality, etc. Besides, recently emerge studies on authentic leadership and absorptive capacity<sup>9</sup>. However, as aforementioned, there is a relative lack of studies on leadership on the scene of school education and organizational citizenship behavior.

Accordingly, this study, on the subject of college students in Korea and China, analyzed the effect of behavioral characteristics of leadership on organizational citizenship behavior and whether self-efficacy has mediating effect in this effect.

Based on the result of this study, this study will grasp what takes college students to become true leaders, fosters leader's basic attainments through leadership and present further considerations.

## **II. RELATED WORKS**

### **A Leadership**

Leadership is a very important factor in concentrating, increasing and inducing the capability of organization members for an enterprise to adapt to environmental change and survive. As to leadership, elastic leadership that can increase comprehensive direction and scope, employees' jobs or involvement in organization based on autonomy and creativity rather than based on direct supervision and control<sup>10</sup>.

Generally, leadership can be defined as the process of exercising influence on persons or organization members to achieve a certain goal.

Here, process of exercising influences means an act of transforming, renewing, energizing and inspiring people.

### **B Leadership Behaviors Characteristics**

In this study, characteristics for admirable leaders to be equipped with include the following five items, although there are diverse characteristics and capabilities needed further<sup>11</sup>.

First, creativity means the ability to make a new way of thinking or idea in conducting the work given to one. Second, communication skill is the ability to share information among organization members and deliver one's intention such as thoughts and impressions in consideration of the other's features and abilities. Third, goal-setting ability is the ability to set a challenging and practicable goal by recognizing and knowing well an organization's goal and share this with subordinates.

Fourth, problem-solving ability is the ability to grasp the essence of problem, present a solution using proper resources and settle the problem in accordance with such strategy regarding problems occurring in relation to work. Fifth, challenging spirit is the ability not to fear failure however it may be difficult and hard work and to achieve the purpose by voluntary and active challenge.

### **C Organizational Citizenship Behaviors**

Organ<sup>12</sup> defined organizational citizenship behavior as free hand, not accredited directly or clearly by official compensation system and, seen totally, personal behavior that facilitates organization's effective functions<sup>13</sup>.

Besides, some study insists that organizational citizenship behavior has positive effect on service quality, customer satisfaction and productivity and is formed by the influence of trust, innovative leadership, leadership validity, organization involvement and job satisfaction<sup>14, 15</sup>.

That is, organizational citizenship behavior means diverse activities conducted voluntarily for the organization one belongs to even though they are one's duty and there is no proper compensation<sup>13</sup>.

### **D Self-Efficacy**

Self-efficacy is defined as judgment on personal ability and belief that a person can carry out actions successfully when trying to obtain a certain result<sup>16</sup>. Matsui & Tsukamoto<sup>17</sup> says that the same person can vary in performance in different circumstances according to the change in the level of self-efficacy while Bandura & Jourden<sup>18</sup> mentioned that even a person who has a high level of talents cannot exercise his ability fully in environment which hurts the expectation of self-efficacy. That is, self-efficacy can be defined as the belief that one can carry out successfully the behavior demanded in a certain task<sup>19</sup>.

### **E Advanced Research**

Lee<sup>5</sup> tested the effect of leadership group activity for college students on leadership and identity in a basic research for developing leadership program.

Kim et al.<sup>20</sup> attempted analysis on leadership experience and level using quantitative data on kinds, quantity and period of leadership experience which influences college students' level of leadership. The result of study showed that indirect experience as well as direct experience makes influence.

Lee & Choi<sup>21</sup> conducted analysis dividing into direct and indirect effects to look into the structural relationships among college students' variables of self-leadership, social support, career motive, career decision self-efficacy and career maturity.

Kim<sup>22</sup> in a study on the effect of authentic leadership on self-efficacy and role performance, added self-efficacy as mediating effect but found no mediator effect<sup>23</sup>. Lee et al.<sup>24</sup> conducted analysis on the relationship between leadership kinds and job attitude with moderating effect of organization support.

## **III. RESEARCH MODEL AND SETTING HYPOTHESES**

### **A Research Model**

In accordance with the purpose of study, causality will be grasped through structural equation model. This study will verify what effect of leadership behavior characteristics has on organizational citizenship behavior on the subject of college students in Korea and China to test whether self-efficacy has moderating effect on leadership behavior characteristics and organizational citizenship behavior (Figure 1).

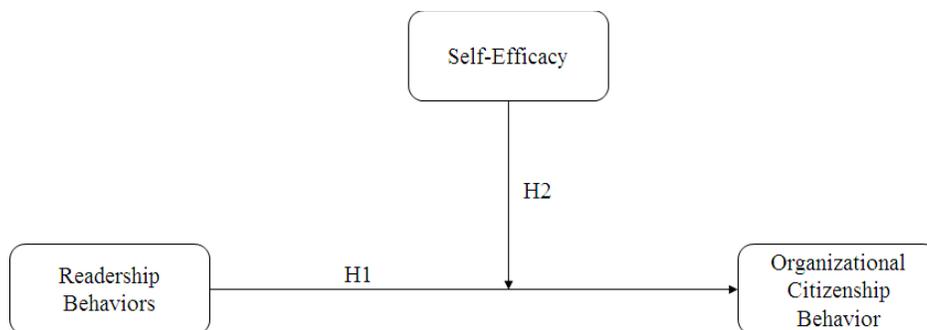


Figure 1: The Proposed Model

It is a proven fact through many results of studies that leadership has positive effect on organizational citizenship behavior.

Generally, human relations kept by members in an organization take a critical role in forming their attitude and behavior and are an important factor to determine job satisfaction and motivation in the organization.

Lee <sup>25</sup> argued that members recognizing superior's considerate behavior positively shows high quality in exchange relation between superior and subordinate and high organizational citizenship behavior recognizing positive evaluation from superior. Kim and Lee <sup>26</sup> analyzed the effect of insulting behavior from superior on organization involvement and organizational citizenship behavior with the result that insulting behavior from superior has no effect on organization involvement and organizational citizenship behavior.

Yang <sup>27</sup> insisted that the superior's communication skill makes positive effect on self-efficacy and orientation to learning objective approached by proximal motivation variable. For a leader to lead along the organization, communication skill is especially important. An organization with good communication is known to have positive effect on organizational effectiveness. Besides, there are many foregoing studies which analyzed the moderating effect of self-efficacy in the relationship between leadership behavior characteristics and organizational citizenship behavior. Especially, it is known that self-efficacy has significant effect on organizational effectiveness (organizational commitment, organizational citizenship behavior, job performance).

Todd <sup>28</sup> suggested that importance of task and job autonomy increase the level of job satisfaction and self-efficacy and has positive effect on organizational citizenship behavior, that is, behavior of mutual cooperation with members of the organization one belongs to and voluntary participation.

From foregoing studies which analyzed the relationship between leadership behavior characteristics and organizational citizen behavior, derived the result that as leadership behavior characteristics are higher, organizational citizenship behavior is higher <sup>10, 22, 25</sup>. Another study substantiated that personality type influences organizational citizenship behavior and that self-efficacy has partial mediating effect<sup>29</sup>.

Leadership behavior characteristics seems to have positive effect on organizational citizenship behavior. Considering this, the following hypotheses was installed.

**H1:** Leadership behavior characteristics will have positive effect on organizational citizenship behavior.

**H2:** Relations of leadership behavior characteristics to organizational citizenship behavior will be influenced by self-efficacy.

## **B Descriptive Statistics of Respondents**

To test the research model, this study conducted a survey with respondents sample derived through convenience sampling. Period of survey was 30 days from December 1, 2015 and the sample was 200 college students in Korea and China. Conducting direct survey and email survey, of total 175 respondents, survey results of 164 who responded sincerely (with availability for analysis) were used for statistical analysis. First, 104 Koreans and 60 Chinese responded to the survey and they were all college students in their 20's (Table 1).

Table 1: Descriptive Statistics of Respondents

		Korea		China	
		Frequency	Percent	Frequency	Percent
Gender	Male	59	56.7	26	43.3
	Female	45	43.3	34	56.7
Major	Humanities	19	18.3	11	18.3
	Societies	28	26.9	6	10.0
	Engineering	44	42.3	6	10.0
	High-tech	13	12.5	11	18.3
	Health	0	0	12	20.0
	Art & Physical	0	0	14	23.3

#### IV. RESULT

##### A Sample Characteristics and Method of Analysis

To test this research model, Smart PLS 2.0 was used. PLS was used because requirements for sample size and residual distribution are relatively not strict<sup>30</sup> with capability to analyze the model for which the relationship between metrics and constructs is formative indicator.

##### B Validity Analysis of Measuring Factors

PLS essentially requires testing internal consistency, convergent validity, discriminant validity.

First, internal consistency is tested with composite reliability and confidence on the subject of reflective indicator. Test showed that composite reliability and Cronbach's alpha were found over the standard limit 0.7. Convergent validity is subject to test with factor loading on AVE (Average Variance Extracted). AVE was found to be over 0.5, the threshold argued by Fornell&Larcker<sup>31</sup>, Chin<sup>30</sup>, etc. (Table 2)

Table 2: Scale items, Factor Loading and Reliability

Construct	Factor Loading	Composite Reliability	Cronbach's Alpha	AVE
OCB1	0.7802	0.8448	0.7793	0.5249
OCB2	0.6625			
OCB3	0.5905			
OCB4	0.7208			
OCB5	0.8418			
SE1	0.8042	0.8355	0.7402	0.5678
SE2	0.8318			
SE3	0.8205			
SE4	0.5077			
L1	0.7566	0.9666	0.9639	0.5592
L2	0.7681			
L3	0.7322			
L4	0.7853			
L5	0.8146			
L6	0.7818			
L7	0.5756			
L8	0.7133			
L9	0.7756			
L10	0.5546			
L11	0.7328			
L12	0.7602			
L13	0.7855			
L14	0.7368			
L15	0.7805			
L16	0.6837			
L17	0.7608			
L18	0.7821			
L19	0.7819			
L20	0.8081			
L21	0.7755			
L22	0.745			
L23	0.7475			

For discriminant validity, the smallest value of AVE's square root (0.7245) appeared to be higher than the largest correlation coefficient value (0.6340). Besides, discriminative validity can be also tested through confirmatory factor analysis and the result of analysis showed that it fulfilled requirements for all survey questions (Table 3).

Table 3: Latent Correlation and Square Root of AVE

	OCB	SE	Leadership
OCB	0.7245		
SE	0.6340	0.7533	
Leadership	-0.3673	-0.4068	0.7478

As the above, the result of testing internal consistency, convergent validity and discriminative validity on the metrics and constructs used in this research model, fulfilled all of them so this model was found to be fit for structural model analysis.

**C Result of Testing Hypotheses**

The results of PLS analysis for this research model are shown in Figure 2 and explanatory power of path model is expressed in explained variance of R<sup>2</sup>. As a result of R<sup>2</sup>, the effect on organizational citizenship behavior was found to be 42.3%. Path coefficient and its significance were tested through PLS analysis<sup>32</sup>.

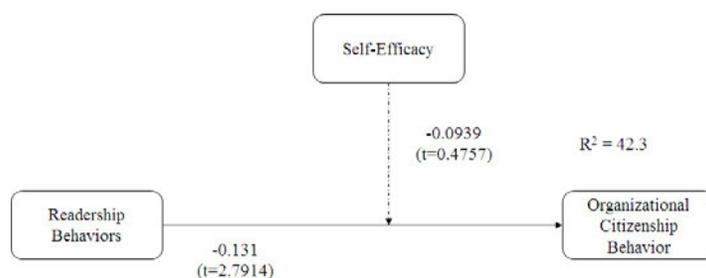


Figure 2: The Proposed Model

Hypothesis 1 that leadership behavior characteristics will have positive effect on organizational citizenship behavior was all accepted. For Hypothesis 2 on moderating effect of self-efficacy, self-efficacy was found to have no moderating effect in the relationship between leadership behavior characteristics and organizational citizenship behavior (Table 4).

Table 4: Path Coefficient and t-Value

Hypothesis				Path Coefficient	T-value	Results
H1:	Leadership	→	OCB	-0.131	2.7914	<b>Accept</b>
H2:	Leadership*SE	→	OCB	-0.0939	0.4757	<b>Reject</b>

**D Discussion on Korea-China Comparative Research Results**

Research results were divided between Korea and China to conduct analysis (Table 5).

It was found that the effect of leadership characteristics on organizational citizenship behavior is higher in Korea than in China. Such a result derived may come from cultural differences between Korea and China.

Though both Korea and China have enforced cramming method of teaching, recently education in Korea is struggling to change the environment from cramming to self-directed study. Besides, social system being democratic seems to have produced a higher result. In case of China being socialist system with cramming method mainly used yet, it showed a lower result than Korea, However, it was found that both countries have no moderating effect of self-efficacy.

Table 5: LATENT Correlation and Square Root of AVE

				Korea		China	
Hypothesis					t-value		t-value
H1:	Leadership	→	OCB	-0.1828	5.0016	-0.1812	3.3144
H2:	Leadership*SE	→	OCB	-0.3828	1.2186	-0.239	1.3759

## V. CONCLUSION

This study, on the subject of Korean and Chinese college students, conducted analysis of influencing factors for leadership behavior characteristic on organizational citizen behavior for voluntary action without receiving orders from others.

Results of study showed that leadership behavior characteristics has positive effect on organizational citizen behavior. Similar conclusions were drawn from many foregoing studies. Especially, leader's behavior characteristics were sorted into five kinds analyzing the influencing factors on organizational citizenship behavior. Analysis was conducted with the mediating effect of self-efficacy.

This study has some suggestions. First, it conducted empirical analysis on college students in Korea and China. Despite many studies so far, empirical studies on the subject of college students in Korea and China are lacking, so this study should have sufficient worth.

Second, results of this study could be used for a practical guide in diverse leadership trainings in progress at colleges. It will also help seek for directivity for fostering basic attainments on leader's behavior characteristics.

Despite such contributions, however, this study has the following limitations. Confining the object of study and samples to college students in Korea and China and a small number of samples must have limitations in generalizing this result.

For future studies, it will need to expand the number of samples and subjects to middle and high school students and the general public besides college students. Second, it has not sufficient academic basis to sort into 5 leadership behavior characteristics. Therefore, it seems important to sort leadership behavior characteristics using delphi method and lead this to theoretical system.

Also, this study failed to consider diverse variables to influence organizational effectiveness besides organizational citizenship behavior. As shown in foregoing studies on testing mediating effectm it is needed to consider factors on psychological capital, organizational justice and job stress.

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## The Perception of the Marriage and Childbirth: Focused on Female Nursing College Students

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### Abstract---

**Background/Objectives:** This study is conducted to understand the perception of the marriage and childbirth. The objectives are to provide basic materials to find fundamental alternatives for increasing marriage and birthrate.

**Methods/Statistical analysis:** Research tools used for this research are composed of questions about demographic and family-related characteristics, job-related characteristics of respondents, awareness for marriage and giving birth to children. For the data analysis, descriptive statistics and t-test were conducted using SPSS 21.0 statistical program.

**Findings:** Demographic characteristics of respondents are in the form of family living with parents and siblings, and level of income of their parents are all above average, and a lot of them had one sibling.

Intentions for marriage appeared to be positive. As the result of researching for the ideal age of women for marriage, the average age was 28.02 years old, and the actual age of their wedding planning was 28.87 years old in average. As the result of researching for consciousness for childbirth, 65.7% of them said that having children is certainly necessary, and the ideal number of children appeared to be 2.54. But the actual number of children that they are actually going to give birth to was 2.12. As the result of verifying differences of intentions for marriage and childbirth according to variable factors of respondents, there were high consciousness for marriage and childbirth, as the relationship between parents are intimate and the relationship with parents are intimate, and as the satisfaction for family life is high.

**Improvements/Applications:** It is considered that education for positive thoughts on marriage and childbirth is necessary and the continuous movement for changing consciousness through social education should be pursued.

**Keywords---** Female, Nursing College Students, Perception of the Childbirth, Perception of the Marriage.

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## I. INTRODUCTION

Population size and structure of the country effect on the competitiveness of the country, socio-economic development and the quality of lives. And reduction of producing population due to decreased fertility has been pointed out as the underlying cause of the slow economic growth according to the labor shortage<sup>1</sup>.

According to the recent statistic of births and deaths in 2015 which National Statistical Office recently released, the total birth rate in our country last year (the number of born children that one woman is expected to bear in lifetime) was 1.24 people, which largely fell short of average birth rate of OECD, 1.7 people. If we look at birth rates by age, the birth rate of more than 30 years old increased, while the birth rate of less than 20 years old decreased. For the age-specific birth rate of mothers (the number of born children per 1000 people by corresponding age), the early 30s was the highest as 116.8 people, the late 20s was the next highest as 63.1 people and late 30s was the next as 48.3 people. The average age of giving birth last year was 32.23 years old, and it increased by 0.19 years comparing to the previous year. Proportion of pregnant mothers aged over 35 was investigated as 23.8%, which increased by 2.2 points from the last year (21.6%). The number of born children in 2015 was 438,700 people which increased by 0.8% comparing to the last year, but it is also the fourth lowest level ever. Major factors of this phenomenon of low fertility are factors according to the social and structural changes, such as pursuit of qualitative life in accordance with the rapid industrialization and urbanization, increasing economic activity of women, social advancement of women, the increase in the age of first marriage, and the increased expense for child support. And a change in the consciousness of the young people for marriage is another major factor for low birthrate<sup>2</sup>. In other words, changes in the consciousness of the young people for marriage, in the situation which the social, cultural, economic and political factors are acting in combination with the whole society encouraging the low birthrate is a factor worth noting.

On this, I would like to provide basic materials to find fundamental alternatives for increasing marriage and birthrate, since there are only enterprises for married people such as supporting child rearing expenses, for policy enterprises being pursued in the country for the business encouraging childbirth currently.

## II. LITERATURE REVIEW

The consciousness for marriage can be expressed as an attitude of expectation for marriage, and it means the positive or negative consciousness of individual related with the marriage, which includes views on marriage, family, love, spouse, gender and gender roles. Whether someone has the positive awareness or negative awareness for marriage effects not only on carrying out the actual marriage, but also on maintaining the married life, procreation and rearing of children<sup>3</sup>. Korean young people recognize marriage as an option, not as a prerequisite, unlike the era which recognized the marriage as a prerequisite for establishing immediate family in traditional society. And this emerged as the very major factor affecting the low birth rate. That is, in the survey for trends of marriage and childbirth for young people, the case of having negative awareness for marriage was 25.7% out of the total. And especially, for the case of unmarried women, it was found that 48.6% of them have negative attitudes<sup>4</sup>.

In the research for perception on childbirth and marriage of college students, female college students had nontraditional views on childbirth and recognized child-rearing burden much more seriously than male college students. Male college students had nontraditional and progressive values on marriage than female college students, and we could see that they avoid or delay the responsibility as a head of household as they become to have individualistic tendencies<sup>5</sup>. That is, in cases of men, they still lay burden of giving birth and raising children on women, and the high pressure for giving birth and raising children effects on the effective value of children, and it reduces the number of children to give birth to<sup>6</sup>. When we assume that the perception of childbirth and upbringing as common responsibilities of the society is generally weak in the society, and various causes caused women's low fertility, it is the important time to seek multilateral solutions to resolve for this. The awareness for marriage is not something that is formed in the marriageable age, but it is one's own value which starts to be established in the early adulthood<sup>7</sup>. Therefore, educational access and interventions targeting early adulthood are important for cultivating positive awareness of marriage. Specially, it is meaningful to investigate the awareness of marriage and childbirth targeting female students in the nursing department, which is one of the majors that almost all graduates get jobs, based on the result that increasing women entering society influences the birth rate.

### III. PROPOSED WORK

The subjects of the study are female college students who enrolled in the nursing department of 4-year university in Seoul, Gyeonggi and Chungcheong provinces. This survey was conducted from 5th, October to 30th, October in 2015, and total of 650 questionnaires were distributed and total of 630 questionnaires were used as final analysis materials, except 20 questionnaires which were not returned or inaccurately filled out.

Research tools used for this research are composed of questions about demographic and family-related characteristics, job-related characteristics of respondents, awareness for marriage and giving birth to children<sup>8</sup>. Detailed contents of questionnaire created for this study are as follows. For questions identifying demographic characteristics of female college students are composed of questions on grades, religion, family structure (nuclear or extended family), monthly income of family, siblings, marital status of siblings, and presence or absence of divorce experience of parents, etc. Variable factors related with family are composed of 5 questions about the democratic inclination of parents, marital intimacy of parents, intimacy with parents, sibling's satisfaction on marriage and their satisfaction on family life. and they were measured with 5 Likert measurement. 5 points was measured as 'very satisfied', 4 points was measured as 'satisfied', 3 points was measured as "usual", 2 points was measured as 'dissatisfied', 1 point was measured as 'very dissatisfied'.

Employment-related variables were questions on their career hopes, and it was measured with 5 points Likert measurement. For questions asking about the perception on marriage, the perception on marriage, perception on the marriageable age, the ideal marriage age, considerations for selecting the spouse, the presence or absence of intention for marriage and the age planning to get married if one has the intention for marriage were asked about. For questions asking about awareness for childbirth, thoughts on the childbirth, ideal number of children, the actual number of children to give birth to, parenting responsibilities and thoughts for women's lives at work were asked about. For the data analysis, descriptive statistics and t-test were conducted using SPSS 21.0 statistical program. The result of this study is as follows.

#### 1) Demographic Characteristics

Looking at the demographic characteristics of subjects of this study, it is like Table 1. Looking at the grade firstly, first grade was the most common as 27.3%, and second grade was 25.2%, third grade was 23.7%, and the fourth grade was 23.8%. As for religion, 52.3% appeared to have religions, and 47.7% appeared not to have religions. Looking at the form of the family, nuclear families were 93.4%, and the extended families were found to be 6.6%. As for the average monthly income of the family, having less than 2 million won appeared to be 16.3%, having more than 4 million appeared to be 31.2%, and having less than 2~4 million appeared to be 52.5%

Looking at relation with siblings, cases of having one sibling were the most common as 54.7%, cases of having two siblings appeared to be 29.8%, cases of having more than 3 siblings appeared to be 12.7%, and cases of being the only child appeared to be 2.8%. For cases of having unmarried, cases of having married siblings appeared to be 12.3%, and cases of having unmarried siblings appeared to be 87.7%. As for presence of absence of experiences divorce and separation of parents, 94.4% appeared not to have such experiences, and it was higher than cases of having the experience, which was 5.6%.

Table 1: Demographic Characteristics

	Category	N	%
Grade	First grade	172	27.3
	Second grade	159	25.2
	Third grade	149	23.7
	Fourth grade	150	23.8
Religion	Yes	329	52.3
	No	301	47.7
Form of the family	Nuclear families	588	93.4
	Extended families	42	6.6
Average monthly income	<2 million won	103	16.3
	200~400 million won	331	52.5
	>4 million won	196	31.2
Relation with siblings	Only child	17	2.8
	One sibling	345	54.7
	Two siblings	188	29.8
	More than 3 siblings	80	12.7
Having married siblings	Yes	77	12.3
	No	553	87.7
divorce and separation of parents	Yes	35	5.6
	No	595	94.4

2) Family-related characteristics and characteristics related with the employment

Family-related characteristics and characteristics related with the employment were analysed using 5 points Likert measurement (Very likely=5 points, likely=4 points, usually=3 points, unlikely=2 points, very unlikely=1 point), and the result is shown in Table 2. Democratic inclinations of parents were 3.82 in average (SD=0.84), and they were close to have democratic inclinations, and intimacy of parents was 3.76 in average (SD=0.92), and parents had intimate relationship in general. And intimacy between parents and themselves was 3.97 in average (SD=0.83), and they were close to each other in general.

In cases of respondents who had married siblings, the satisfaction rate for marriage was 3.76 in average (SD=0.64) and it was high in general. Their own satisfaction rate for family life was 3.72 in average (SD=0.88), and it was high in general. The degree of hoping for employments appeared to be high as 4.92 in general (SD=0.32), and most of them appeared to hope for employments.

Table 2: Family-Related Characteristics and Characteristics Related with the Employment

	Category	M	SD
Family-related characteristics	Democratic inclinations of parents	3.82	0.84
	Intimacy of parents	3.76	0.92
	Intimacy between parents and child	3.97	0.83
	In cases of respondents who had married siblings, the satisfaction rate for marriage (N=77)	3.76	0.64
	Satisfaction rate for family life	3.72	0.88
Employment-related characteristics	Degree of hoping for employments	4.92	0.32

3) The awareness for marriage

Looking at the result for the awareness of marriage of respondents, it is shown in Table 3. 66.7% of respondents appeared to have positive awareness, and 33.3% of them appeared to have negative awareness. Specifically, 16.4% of them said that marriage is imperative, 50.3% of them said that it is good to get married, 29.1% of them said that either of getting married or not getting married is okay, 3.2% said that it's better not to get married, and 1.0% said that they didn't know. As for the recognition of marriageable age, 68.8% said that there 'is' marriageable age, and 31.2% said that there 'isn't' marriageable age. As the result of researching the ideal age for marriage for female, among who answered that there is marriageable age, 28 ~ 29 years old was the most common as 50.3%, younger than 27 years old was 29.0%, and more than 30 years old was 20.7%. As for considerations when selecting spouses, economic power (34.6%) appeared as the highest, trust and love (27.3%), personality (17.4%) and home environment (8.9%) appeared in order. The result of researching the actual intention for marriage in future, 91.3% said that they have intentions for marriage, and 8.7% said that they don't have intentions for marriage. As the result of researching the age planning to get marriage among female college students who had intentions for marriage, 28~29 years old was the most common as 38.1%, more than 30 years old was 37.7%, and less than 27 years old was 24.2%.

Table 3: The Awareness of Marriage

	Category	N	%
the awareness of marriage	Be imperative	104	16.4
	Be good to get married	317	50.3
	Either of getting married or not getting married is okay	183	29.1
	Better not to get married	20	3.2
	Didn't know	6	1.0
recognition of marriageable age	Yes	433	68.8
	No	197	31.2
the ideal age for marriage for female	≤27years	183	29.0
	28~29years	317	50.3
	≥30years	130	20.7
considerations when selecting spouses	Physical condition like appearance	24	3.8
	Economic power	217	34.6
	Educational background	8	1.2
	Religion	40	6.3
	Trust and love	172	27.3
	Personality	110	17.4
	Home environment	56	8.9
	Others	3	0.5
actual intention for marriage in future	Yes	575	91.3
	No	55	8.7
age planning to get marriage	≤27years	152	24.2
	28~29years	240	38.1
	≥30years	238	37.7

## 4) The awareness of childbirth

If we look at the survey results for the awareness of childbirth of respondents, it is shown as Table 4. Looking at the awareness for the need for children, 65.7% said that 'Children are absolutely necessary', 28.3% said that 'It does not matter even if there is no children', 2.3% said that 'Having daughters is necessary', and 0.5% of them said 'Having sons is necessary'. If we look at the awareness for the ideal number of children in one family, 2 children was the most common as 72.3%, and more than 3 children was following as 19.2%, 1 child was 5.3%, and 3.2% said that they don't care even if they don't have children. As the result of the actual number of children that want to have, 2 children was the most common as 67.2%, and 1 child was the following as 15.2%, and more than 3 children was 12.3%, and 5.3% said that they don't care even if they don't have children. The actual number of children that they want to have was lower than the ideal number of children. As for the responsibility of raising children, 87.3% of them thought it is 'couple jointly', and 'possible person of the family' followed after as 8.1%, 'mother' and 'the nation' were 2.6% and 1.4% respectively, and 0.6% answered 'father'. And we could see that we are now out of the traditional awareness that mother has the responsibility of raising children.

As for the item about careers after marriage for women, 'continue' was 65.2%, 'continue again after raising children' was 14.7%, and it could be seen that most of respondents who want employments want to maintain career after marriage.

On the other hand, 16.4% said that 'They would quit if it interferes family life', 3.5% said 'They would quit if they get pregnant', and 0.2% said 'They would quit no matter what'.

Table 4: The Awareness of Childbirth

	Category	N	%
Awareness for the need for children	Children are absolutely necessary	414	65.7
	It does not matter even if there is no children	178	28.3
	Having sons is necessary	3	0.5
	Having daughters is necessary	15	2.3
	Others	20	3.2
Ideal number of children in one family	Don't care even if they don't have children	20	3.2
	1	33	5.3
	2	456	72.3
	≥3	121	19.2
Actual number of children that they want to have	Don't care even if they don't have children	33	5.3
	1	96	15.2
	2	423	67.2
	≥3	78	12.3
Responsibility of raising children	Mother	16	2.6
	Father	4	0.6
	Couple jointly	550	87.3
	Possible person of the family	51	8.1
	The nation	9	1.4
Careers after marriage for women	Continue	411	65.2
	They would quit if it interferes family life	103	16.4
	They would quit no matter what	1	0.2
	They would quit if they get pregnant	22	3.5
	Continue again after raising children	93	14.7

## 5) Comparison of family-related characteristics and job related variables according to intentions for marriage.

The result of comparing family-related characteristics and job related variables according to intentions for marriage is shown in Table 5. It appeared that there were differences in familiarity of parents of respondents,

familiarity of parents and themselves, and the satisfaction rate of family life, between who had intension for marriage and who didn't have intention for marriage.

Table 5: Comparison of Family-Related Characteristics and Job Related Variables According to Intentions for Marriage

	Category	Yes(N=575)		No(N=55)		t
		M	SD	M	SD	
Family-related characteristics	Democratic inclinations of parents	3.84	0.78	3.78	0.85	0.43
	Intimacy of parents	3.79	0.84	3.12	0.98	10.33**
	Intimacy between parents and child	3.99	0.78	3.55	0.81	5.78**
	In cases of respondents who had married siblings, the satisfaction rate for marriage (N=77)	3.78	0.65	3.62	0.68	1.24
	Satisfaction rate for family life	3.74	0.84	3.52	0.89	4.56**
Employment-related characteristics	Degree of hoping for employments	4.93	0.28	4.82	0.33	0.98

6) Comparison of family-related characteristics and job related variables according to intentions of childbirth

The result of comparing family-related characteristics and job related variables according to intentions of childbirth is shown in Table 6. It appeared that there were differences in familiarity of parents of respondents, familiarity of parents and themselves, and the satisfaction rate of family life, between who had intension for childbirth and who didn't have intention for childbirth.

Table 6: Comparison of Family-Related Characteristics and Job Related Variables According to Intentions of Childbirth

	Category	Having intension for childbirth (N=414)		Not having intention for childbirth (N=178)		t
		M	SD	M	SD	
Family-related characteristics	Democratic inclinations of parents	3.82	0.77	3.76	0.82	0.39
	Intimacy of parents	3.80	0.82	3.13	0.88	5.63**
	Intimacy between parents and child	4.04	0.88	3.22	0.81	8.68**
	In cases of respondents who had married siblings, the satisfaction rate for marriage (N=77)	3.88	0.45	3.52	0.65	2.14
	Satisfaction rate for family life	3.94	0.74	3.53	0.89	5.42**
Employment-related characteristics	Degree of hoping for employments	4.94	0.24	4.85	0.43	0.78

**IV. CONCLUSION**

This paper proposed an improved decision tree algorithm for prediction of dropout student. The objective of this work is to develop an improved decision algorithm that enhances the ability to form decision trees and thereby to prove that the classification accuracy of improved decision algorithm on educational dataset is greater. A new decision tree model is to be constructed by using Renyi entropy for calculating the information gain and the association function will be used which determines the relative degree between the given attribute and class C. Experimental results will prove that improved decision tree algorithm will provide better prediction accuracy on student dropout data than that of traditional classification algorithms.

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# The Multicultural Empathy as a Cultural Phenomenon

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## Abstract---

**Background/Objectives:** This paper has been prepared in order to understand the multicultural society. "Multicultural empathy", it will look at the cultural phenomenon. Empathy makes a connection between people.

**Methods/Statistical analysis:** The study was developed literature data research and visiting various sites on the Internet. By analyzing and interpreting the records made in the future to help the research. Through many literary works and films, television dramas can see the appearance of these people. Social Changes begins so. So that different cultures are obtained by forming the name of the new culture.

**Findings:** As everyone knows, one of the important characteristics of the structural changes in the society of the 21st century is the shift from the single-cultural society to the multicultural one. With the rapidly developing traffic and communication, intercultural contacts and exchanges are increasing and a new era in which heterogeneous cultures exist in a mixed way is becoming a reality in the global society. Against this backdrop, discussions over the multicultural society is being actively done around the world; sometimes, the negative aspect of multicultural society is highlighted, and other times, its positive functions are emphasized. But in many cases, it is viewed as an advanced aspect of changes in the society. Sometimes the need for changes in the artificial islands, and also called for changes in its slippery nature awareness.

**Improvements/Applications:** Now, multiculturalism has become a cultural phenomenon. Sympathizing with multiculturalism is also an aspect of a culture. It is about time to actually put it into practice.

**Keywords---** Culture, Multi-culture, Multicultural Society, Empathy, Changes of Awareness, Social Development.

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## **I. INTRODUCTION**

There was an article on an advertisement featuring a multicultural family in Korea in the August 8th, 2016 edition of the Indonesian newspaper <Media Indonesia>. Although it was an article which introduced a commercial advertisement, it has many implications to us. Currently, many countries are suffering from big or small troubles caused by prejudices and misunderstanding of other cultures. This is also an important issue in the 2016 US presidential election and the terrorist attack on July 14th, 2016 in Nice in France, which hurt 202 people and killed 84, urged people around the world to have a broad understanding of multiculturalism.

Discussions on multiculturalism and multicultural society have already been deployed in a variety of areas. Sometimes also it highlighted the negative issues, and there are very large accumulation of research, while also highlighting the good side.

Even though the discussion of this situation is still being actively made. It is because living well with people that make up the society because in order to be so in the hope of everyone is needed even more deep understanding of the multicultural society. It is necessary for this right is the spirit of empathy.

Of course, it should be a sufficient understanding of the multicultural premise for this, such as empathy. For example, it is necessary to be sure, even within the scope of cultural policy and more specifically the direction of finding practical problem solving.

## **II. CHANGE IN SOCIETY AND SYMPATHY OF THE MEMBERS IN THE SOCIETY**

### ***A. Understanding of Multicultural Society***

In a broad sense, migration has become a global phenomenon, being regarded as one of the hottest issues facing the world in this century. And Korea is no exception.

Modern Korean society is going through a rapid process of shifting to the multicultural society. The number of foreigners who are residing in Korea is over 2 million as of July 2016. And among them, around one million are workers who have a job in Korea. Against this backdrop, the status of the foreigners in Korea is getting much better compared to the past; we have the first member of the National Assembly from the immigrant population and the foreigners who appear on various media including TV do not look like poor immigrants any more. Despite the positive phenomena caused by these changes, conflicts caused by the sense of difference between different cultures are bound to appear as a serious social issue. Even if the problems encountered are inevitably derived from the process of multicultural socialization it will have to recognize and promote this solution.

The word "culture" is based on the "identity and originality" by the medium of a specific place where each culture is situated. Nevertheless, the future in front of us will become a multicultural society where everything is connected through globalization without boundaries between countries, whether we want it or not. The important thing is the communication and understanding of the multiculturalism, which entered into the category. Without learning and understanding multiculturalism, we cannot communicate and get together with people who have lived in different cultures.

As you can see, it is not one of the important features of the 21st century, social structure changes may include the transition to a multicultural society in a single cultural community as an example. Due to the rapid development of cross-cultural contact and exchange, such as transportation and communication, which is increasing, it has become a new era is now a reality of our society is heterogeneous mixed cultures. Of course, this is not our own situation. It is also the phenomenon of migration is widely seen all around the world so far to say one of the biggest challenges the world has faced issues of the century.

Social deal for this phenomenon, such Nonetheless, many countries must show does not show only the positive sense. We will be in the skin that can be easily seen around other foreigners, including conflicts arising from differences of religion reflects this reality. To become a society to be composed in a good direction are fully considered these issues in the process of socialization. Therefore, these phenomena arises the need to attract another point of view, not only look at the framework of the cultural escape. That's just the spirit of empathy.

### B. Multicultural Society and Human Rights

We believe that everyone, both Korean and foreigners, has a right as a human being, which cannot be intruded or infringed at any time. This belief is so taken for granted that nobody would question it. But in reality, this belief is realized in a totally different way, facing a number of challenges. Sometimes, we create a stereotype about members of various ethnic groups without realizing it, and paradoxically, it can be a power that drives the development of multicultural human rights.

The development of information and communication media greatly contributes to the globalization of today's human rights movement. Now the thought on the human rights is encountered by the flow of the times in which it is more than a problem of securing the basic rights that are stipulated by law. It also has a task of encircling the world within a border as well as preparing the normative frame at an international level.

The discussion over the multicultural civil rights in which immigrants and minority ethnic groups becomes the subjects, and which is needed for social integration, is based the strengthening of social integration through extended common culture, common identity, common sense and style by providing the opportunity of participating in education, politics, culture, and society for the minority groups, which have been excluded from society. Sharing identity and integration through it will contribute to the shift to a healthy society interconnected with other systems in diversity.

Today, the term multiculturalism refers to the multicultural phenomena in various areas such as immigration, labor market, education, mass media policy, and art along with the "the melting-pot", and at the same time, it reflects the subtle political ideologies, which indicates the expansion of ideological systems. Human rights is the basis of this expansion and the ideological foundation of it.

The year 2018 to come will be another turning point for multiculturalism in our society. The UN State of the Future mentioned the necessity that Korean society needs to prepare for multiculturally integrated society, expecting that by 2018, multiculturalism will be developing in earnest in Korea as the immigration population will take up 10% of the total population and the members of the current multicultural families will get married and have children by that time.



Figure 1: Multicultural Family

The figure 1 shown above is the article of <Media Indonesia> mentioned in the introduction. The contents of the advertising, which emphasized that communication between the family members is most needed for the members of the multicultural families, and the contents of the article, which introduced this, show the magnanimity of the human rights in which we all become part of the group of us. Now is the time when social establishment that secures human rights of the foreigners regardless of skin color, nationality, and language is greatly needed.

### **III. THE PHENOMENA IN THE MULTICULTURAL SOCIETY FOR SYMPATHY**

#### **A. *Diaspora and Welfare System***

What is empathy? The positive concept of multiculturalism puts its basis on the respect for culture, language, social customs of the mainstream society in the area of life as well as recognizing the existence of ethnic groups by allowing cultural diversity for social integration.

This is not simply limited to the ban on the discrimination against other cultures and ethnic groups; it also includes the cases of encouraging the equality of the result through aggressive financial and legal support for social participation of the minority groups admitting their competitive disadvantages. It is defined as communal multiculturalism. In this case, financial and legal aids are provided for the minority groups and the equality of the process through policies is sought on the basis of the minority group quota system in job seeking and education.

We need to pay attention to the concept of Diaspora. As Typically, the word 'diaspora' to be interpreted in such a discrete national or ethnic origin is widely distributed, have their origin in Greek. "Diaspora" is but the original Greek meaning 'discrete', today there are more cases to use the "diaspora" to refer to "the discrete nation" with a little more common.

Since the 1990s, research began in earnest on this diaspora has been used as a broad concept that includes the experience of a particular nation, as well as international migration, asylum, refugees, migrant workers, ethnic communities, cultural differences, such as the identity of other people. However, the search for conditions that do what has to be the reason why the concept of diaspora is used very widely is needed. As one example, William Safran is said to be called "move around in a foreign place from specific originators" such as Diaspora must meet all six conditions for holding them.

Such conditions may be based on looking at the social it will be helpful to the understanding of the multicultural society. Now, it should accept these diaspora in society.

Also, to understand the phenomena of multicultural society and accept it clearly, we need to examine the understanding of the welfare-system of a society.

The welfare system is like reliable money in the pouch that can help the shift from one society to another. This does not mean that it should be like air or water (Of course, in some society, air and water are more important than money, but here, we did not use them as goods, which are scarce and precious.).

In order to progress in a multicultural society should be at a substantial realization of the social welfare system. Communicate with various people over the welfare of a well-lived makes the least possible social integration with the aim of a reality. But welfare is indeed difficult to balance even as the requirements of social development. Yet tinged with values that depend on each other is the duality that may conflict with each other. Welfare is the fruit of a long history of machine or embellish to achieve human society.

The emergence of the modern state was the premise that it is possible to guarantee the civil liberties and property, and even personal well-being is just above the base of equality ideology. Multicultural society can be called a symbol of this country.

As it is today, welfare nation is one of the most dynamic achievements of 20C century. Now would be the welfare of their own well-being, not just as a matter of the survival of the individual in society as equal presence must look into the culture and living conditions to improve the quality of life. That way we can all be together.

#### **B. *Awareness, Changes, and Practice***

Many researches on the multicultural society shows that acceptance of multiculturalism differs depending on the age, occupation, and experience in multicultural education, activities, contact, and exchange in Korean

society, and that it is needed to perform education and promotion of the multiculturalism that suit the situation and eye level of the targets to spread the positive awareness on multiculturalism.

Also, "anti-sentiment" of the society members toward foreigners is also growing with the rapid increase in crimes committed by foreigners. With the ongoing cruel crimes being committed by foreigners, a new term "xenophobia(hatred for foreigners), which is the combination of "xeno(stranger)" and "phobia(hate, evade)", showed up.

The "xenophobia" phenomenon, hatred for foreigners, is already prevalent on the Internet, and whenever crimes committed by foreigners happen, people get critical of them. The bigger problem is that unless negative awareness about the foreign immigrants disappear, the vicious circle of "discrimination" and "crime" will be repeated. Therefore, perception of the Korean people toward foreigners needs to change first to break this circle. We cannot overlook that behind the crimes of the foreigners lies the reality of them leading the difficult life as strangers in Korea. We need to analyze the reasons why they committed crimes and focus on solving the problems.

As everyone knows, what triggered the Brexit decision, the withdrawal of the United Kingdom from the European Union, was the problem of immigrants in most part. This has big implications for Korea, which enters the era of 2 million foreign residents. In the era of 8.2 billion multicultural families and 2 million foreigners, the shift to the multicultural society looks so natural.

The "2015 Research on the acceptance of multiculturalism by Korean people" conducted by Gallup Korea, which was done as the Ministry of Gender Equality and Family commissioned the Korean Women's Development Institute for the research, shows that acceptance of multiculturalism of the Korean society is still at a low level.

The result of comparing the major research items targeting at adults(average people) with the international index items shows that multiculturalism acceptance of the Korean society is still low compared to that of the major advanced countries. For example, the ratios of "I will hire domestic workers first when there are not many job openings", and "I will not accept foreign workers as my neighbors" were relatively high, while the ratio of "I think of myself as a global citizen" was relatively low-as shown in below figure 2-.

Division	Korea(S)	US	Germany	Sweden	Australia
I will hire domestic workers first when there are not many job openings	60.4	50.5	41.5	14.5	51.0
I will not accept foreign workers as my neighbors	31.8	13.7	21.5	3.5	10.6
I think of myself as a global citizen (Generally, Yes)	55.3	69.1	62.3	82.0	79.5

Figure 2: World Value Survey (2010-2014) & 2015 Research on the acceptance of Multiculturalism by Korean People

Also, as for the age, teenagers (middle & high school students) were 67.63 point, people in 20s 57.50 point, people in 30s 56.75 point, people in 40s 54.42 point, people in 50s 51.47 point, people in 60s and older 48.77 point, showing that younger people were more likely to accept multiculturalism.

This research also shows that activities, exchange, and the experience of education on understanding multiculturalism have a big effect on the multiculturalism acceptance. In this respect, we need to continuously expand the education on understanding multiculturalism and keep increasing the exchange and communication with multicultural families in all social groups including various ages and jobs.

In our global village, there are 242 countries and numerous ethnic groups. Multiculturalism can raise the culture of human community. 7.4 billion people in the global village should think about the development of

our community. The most important thing is the attitude of living together. The touching moments of 2016 Rio Olympics, where all the people around the world were together(The American fencer wearing hijab, and the African-American and white people holding and encouraging each other), showed that the world is one now. Multiculturalism does not recognize the superiority of a particular race or superiority of a particular cultures, it can be established on the basis of respect for human dignity and universal values, relative values of the culture that they've achieved.

The world is rapidly changing into a place where various ethnic groups live together. And Korea should follow the suit with the rest of the world.

#### **IV. CONCLUSION**

Multiculturalism has recently come to meet the new challenges. Deepening of social absurdity, due to poverty and economic inequality, large and small, such as the war should be thinking about multiculturalism again. The Syrian refugee crisis may be triggered by one of those examples.

However, the same problem is not the work of one country only. The problem is also happening in many countries. In the US became a multicultural country such problems emerged in the presidential election process, the UK and Spain also suffer from nationalism and this happens.

Different skin colors, languages, and cultural customs cannot be the targets of discrimination and this is the basis of multiculturalism. The effort to help and cooperate with the discriminated people and eliminate the discrimination is noble itself. And thinking of it natural needs the attitude of sympathizing with it. Korea had a lot of aids from many countries in the 1950s and 60s in the era of poverty. Now, Korea is ranked 10th in the world and became an economic power, helping many poor countries around the world. It is providing food and medical support for countries in Africa, which suffer from hunger and diseases, and making great effort for the world peace in earnest. Along with this external efforts, Korea needs to pay attention to its internal appearance.

The various ethnic groups living in the country, and it will belong to individuals healthy and desirable dream of the society, while preserving the cultural identity of their own. The migrants of various nationalities have pride in their culture is helpful also for the community.

We are one humanity. Although living in the border of the state, but now is the time to have a brotherhood than ever.

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## The Effects of the Oral Health Education Program on Oral Health of Maladaptive School Children

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### Abstract---

**Background/Objectives:** This study investigated the effects of an oral health education on oral health of maladaptive school children.

**Methods/Statistical analysis:** For this study, 20 fifth-grade students, who were classified as being maladaptive, were randomly assigned to the study group and 20 to the control group, and oral health education was conducted for five weeks. Subsequently, the oral health knowledge, oral health behaviors, and dental plaque management index before and after oral health education were analyzed.

**Findings:** After the five-week oral health education program, oral health knowledge, oral health behaviors, and dental plaque management index increased significantly more in the experimental group than in the control group ( $p < 0.01$ ), and the effects were maintained four weeks after the test was finished ( $p < 0.05$ ). In conclusion, oral health education seems to be an effective method of improving oral health behaviors and dental plaque management index of maladaptive school children.

**Improvements/Applications:** Future research will need to develop systematic and standardized oral health education.

**Keywords---** Dental plaque, Oral Health Behavior, Oral Health Knowledge, School Maladjustme.

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## I. INTRODUCTION

In this rapidly changing modern society, school maladjustment causes the loss of traditional familial functions and as more women are employed, their children tend to form unstable attachment in early childhood. Thus, individuals develop insufficient capacity to respond to stressful environment.<sup>1</sup>

The level of oral health varies depending on presence of attention deficit hyperactivity disorder (ADHD), and children with these symptoms are less likely to practice toothbrushing before sleep than those without the symptoms, and the former also show worse oral health and decayed-missing-filled-teeth (DMFT) index than the latter.<sup>2</sup> Also, these children have a high percentage of toothache, bruxism, gum bleeding, and dental trauma, which leads to necessity of creating a detailed oral health education program for treatment and prevention of oral diseases<sup>3</sup>.

Most of the previous research either focused on general elementary school children and conducted oral health education programs for them<sup>4</sup>; or, investigated only the oral health without applying an oral health education program, such as the research on oral health of children with ADHD<sup>2</sup>, comparison of DMFT between people with intellectual disability and non-disabled people<sup>5</sup>, research on eating habits of children with ADHD<sup>6</sup>, and research on DMFT of children with cerebral palsy<sup>7</sup>.

So far, there has been no research in which an oral health education program was applied to maladaptive school children. Therefore, in this study, an oral health education program based on use of videos and computer, and individual instruction and repeated learning of tooth brushing by using disclosing solution was conducted to maladaptive school children for five weeks. And then, the effects of the program on maladaptive school children were analyzed based on oral health knowledge, perceived benefits, oral health behavior, and dental plaque management index of the experimental group and control group.

## II. METHOD OF STUDY

The oral health education program for maladaptive school children was conducted between April 28 and July 11, 2015. For the study, a school adjustment inventory test was performed with the entire fifth grade students, 145 in total, of an elementary school located in Iksan. Subsequently, the children were divided into the high score, mid-score, and low score groups, and, based on advice of a child psychotherapy specialist, 42 children in the group who had low scores in the school adjustment inventory test were finally selected as maladaptive school children. After excluding two students who were disqualified, the remaining 40 children were randomly assigned to the experimental group and the control group with 20 subjects each.

The basic contents and structure of the program were based on the modified health promotion model of Pender<sup>8</sup>, and the program draft was designed based on review and analysis of previous research<sup>4,9-12</sup>. Validity of the program contents was reviewed and verified by relevant experts, i.e., a child psychotherapist, professor of preventive dentistry, dentist, dental hygienist, professor of oral health, and school nurse. Also, a pilot study was conducted by randomly selecting five fifth-grade students from an elementary school that is unrelated to the subject school, in order to examine and resolve problems with applying the oral health education program to maladaptive school children. After modification and supplementation based on validity verification by using advice of experts and the pilot study, the final oral health education program was developed.

The oral health education program was provided once per week, for a total of five weeks.

The oral health education program consisted of the following: In week 1, the children learned about function and importance of teeth; in week 2, about the causes and prevention of dental caries; in week 3, how to use dental floss and other dental care products; in week 4, about fluoride to prevent dental caries and how to make teeth and, in week 5, about foods that are beneficial and those that are harmful for teeth.

By using SPSS21.0, the data analysis was conducted in accordance of the purpose of this study as follows: Before applying the oral health education program, a paired t-test was performed to examine difference in oral health knowledge, oral health behavior, dental plaque management index, etc. between the experimental group and control group. After applying the program, a repeated measures analysis of variance was conducted to examine the difference between before and after the study.

### III. RESULT

Table 1 shows difference in oral health knowledge scores of maladaptive school children between the experimental group and control group after oral health education. There was no significant difference between the two groups before application of the proposed program ( $p > 0.05$ ). However, after application of the program, oral health knowledge of the experimental group, in comparison to that of the control group, significantly improved after the test and in the follow-up four weeks after the study ( $p < 0.01$ ). (Table 1)

Table 1: Comparison of Scores for Oral Health Knowledge Between two Groups Before, After, and Follow-Up

Variables	Before	After	Follow-up		F	p
	Mean±SD					
Control(n=20)	70.00±16.71	73.64±17.17	75.55±18.79	Time	60.376	***0.001
Study(n=20)	60.20±20.31	92.27±8.98##	92.27±8.48##	Group	3.861	0.057
				T×G	36.274	***0.001

The data were analysed by repeated measure ANOVA.

\*  $p < 0.05$ , \*\*  $p < 0.01$ . \*\*\*  $p < 0.001$

## significant difference from control group at  $p < 0.01$ .

Table 2 shows difference in oral health behaviors of maladaptive school children between the control group and experimental group after the oral health education program. There was no significant difference between the two groups before application of the proposed program ( $p > 0.05$ ). However, after application of the program, oral health behaviors of the experimental group, in comparison to that of the control group, significantly improved after the test and in the follow-up four weeks after the study ( $p < 0.01$ ). (Table 2)

Table 2: Comparison of Scores for Oral Health Behavior between two Groups Before, After, and Follow-Up

Variables	Before	After	Follow-up		F	p
	Mean±SD					
Control (n=20)	38.65±6.14	39.25±5.56	38.30±5.12	Time	46.671	***0.000
Study(n=20)	37.70±4.34	45.65±2.91##	42.90±3.34##	Group	5.728	*0.022
				T×G	37.258	***0.000

The data were analysed by repeated measure ANOVA,

\*  $p < 0.05$ , \*\*  $p < 0.01$ . \*\*\*  $p < 0.001$

## significant difference from control group at  $p < 0.01$ .

Table 3 shows difference in dental plaque management index of maladaptive school children between the control group and experimental group after the oral health education program. There was no significant difference between the two groups before application of the proposed program ( $p > 0.05$ ). However, after application of the program, dental plaque management index of the experimental group, in comparison to that of the control group, significantly improved after the test and in the follow-up four weeks after the study ( $p < 0.01$ ). (Table 3)

Table 3: Comparison of Scores for O'leary Index between two Groups Before, After, and follow-Up

Variables	Before	After	Follow-up		F	p
	Mean±SD					
Control (n=20)	58.46±18.88	56.00±17.42	54.24±16.47	Time	6.516	*0.013
Study (n=20)	59.05±20.33	74.77±11.56##	73.48±10.63##	Group	7.670	**0.009
				T×G	15.277	***0.000

The data were analysed by repeated measure ANOVA,

\*  $p < 0.05$ , \*\*  $p < 0.01$ . \*\*\*  $p < 0.001$

## significant difference from control group at  $p < 0.01$ .

#### IV. CONCLUSION

In this study, to examine the effects of an oral health education program on oral health of maladaptive school children, the subjects were divided into an experimental group and control group and received oral health education once per week for five weeks, and their oral health knowledge, oral health behaviors, and dental plaque management index were analyzed.

There was no difference in general characteristics, oral health knowledge, oral health behaviors, and dental plaque management index between the experimental group and control group ( $p > 0.05$ ). After the oral health education program was provided, oral health knowledge significantly improved in the experimental group in comparison to the control group, ( $p < 0.05$ ), and also significantly improved after the test and in the 4-week followup in comparison to before the test ( $p < 0.001$ ). After the oral health education program was provided, oral health behaviors significantly improved in the experimental group in comparison to the control group, ( $p < 0.05$ ), and also significantly improved after the test and in the 4-week followup in comparison to before the test ( $p < 0.001$ ). After the oral health education program was provided, dental plaque management index significantly improved in the experimental group in comparison to the control group, ( $p < 0.05$ ), and also significantly improved after the test and in the 4-week followup in comparison to before the test ( $p < 0.001$ ).

In this study, applying an oral health education program to maladaptive school children was effective for improving oral health knowledge, oral health behaviors, and dental plaque management index of the children. The findings suggest that providing oral health education has positive effects on improving oral health of maladaptive school children.

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## Effects of Integrative Dementia Prevention Program on Cognition, Depression, and Quality of Life in the Elderly

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### Abstract--

**Background:** Number of aged people has been rapidly increased. due to increase of aged people in our country at present, geriatric, chronic disease is rapidly increased and it was emerged as a social issue.

**Objectives:** In this study, in order to prevent dementia that is senile disease creating various social problems at an early stage, integrated dementia prevention program was presented and its effectiveness is intended to be verified. 24 people normal elderly living in the community.

**Methods:** Progress of this study and data collection period was 3 months from June to August, 2014 and objective of the study was explained to test subjects before starting the test and a consent form for participation in the study was received from them. In the study, intervention period was 10 weeks and it was progressed based on 3 times week and integrated dementia prevention program was directed to be performed for 60 minutes per 1 time.

**Statistical analysis:** In this study was to use a pre-post test, statistical program Spss 18.0 version was used.

**Findings:** Cognitive function change of test subjects who participated in integrated dementia prevention program is as evaluation score was significantly increased ( $p < 0.01$ ) in MMSE-K and MOCA-K that evaluate cognitive ability before/after participation in the program, cognitive function was shown to be improved. Depression change of test subjects who participated in integrated dementia prevention program is as evaluation score was significantly decreased ( $p < 0.01$ ) in GDS-K score that evaluates depression level before/after participation in the program, depression was shown to be decreased. Quality of life change of test subjects who participated in integrated dementia prevention program is as evaluation score was significantly increased ( $p < 0.01$ ) in EuroQol-5D that evaluates quality of life before/after participation in the program, quality of life was shown to be improved.

**Improvements:** Cognitive abilities of the subjects were improved, decreased depression and improved quality of life.

**Applications:** We have to develop diversified intervention programs for preventing dementia and it is expected that more systematic program would be developed and be widely utilized in the elderly of local community and each institution.

**Keywords---** Dementia, Cognition, Depression, Occupational Therapy, Elderly.

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## I. INTRODUCTION

At present, environment of life has been greatly improved owing to development of medical technology and science and consequently, as human average life is increased together with enhancement of quality of life, number of aged people has been rapidly increased. Due to increase of aged people in our country at present, geriatric, chronic disease is rapidly increased and it was emerged as a social issue<sup>1</sup>. According to data of Statistics Korea in 2015, our country has already entered into aging society in 2000 and in 2015, the elderly population aged over 65 was 6.62million that accounts for 13.1% of the total population and in 2030, it is forecasted that such population would exceed 20% and we will enter into super aging society<sup>2</sup>. As the population is increased, geriatric diseases are also increased and among these, the disease having the highest incidence rate as a social issue is dementia. Number of dementia patient in our country was app. 540,000 and its number is being increased rapidly and it is estimated that in 2050, number of dementia patient would reach app. 280,000 by it being increased by 2 times every 20 years in the future<sup>3</sup>. Dementia is an organic mental disease in which cognitive function and mental function such as judgment, language, emotion being undertaken by human cerebrum are degenerated and it is learned as complex clinical syndrome causing problem in daily life, social activity and inter-personal relation by accompanying symptoms including depression, delusion<sup>4</sup>. Like this, as a disease decreasing quality of life of patients themselves and requiring sustained care of supporter as well, dementia causes serious mental, psychological, physical, economic burden to the supporters<sup>5</sup>. Like this, we have to promptly recognize problems of dementia and now is the time to exert an effort of overcoming dementia at nationwide level for decreasing its incidence rate and moderating development speed by controlling dementia at an early stage<sup>6,7</sup>. In this study, in order to prevent dementia that is senile disease creating various social problems at an early stage, integrated dementia prevention program was presented and its effectiveness is intended to be verified.

## II. METHODS

### A. Participants

Subjects of the study were 24 normal elderly women aged  $\geq 65$  years, who had visited a dementia support center located in the D region, Seoul, from June to August 2014.

### B. Design

This study is an experimental research for observing change of cognitive function, depression, quality of life by providing normal elderly living in local community with integrated dementia prevention program and pre-post design for a single group was performed.

### C. Measures

In this study, to assess the cognitive functions of elderly subjects, the following tools were used: 1) Mini-Mental Status Examination, Korean version (MMSE-KC) and 2) Montreal Cognitive Assessment, Korean version (MOCA-K). For assessment of depression, the Korean version of the Geriatric Depression Scale (K-GDS) was used. Lastly, quality of life was measured by EuroQol five dimensions questionnaire (EuroQol-5D).

#### **Mini Mental State Examinations- Korea (MMSE-K)**

As cognitive function scale, Korean type MMSE-K that was standardized by Gwon, Yong-Cheol and Park, Jong-Han<sup>9</sup> by targeting the elderly of our country based on Mini Mental State Wxaminations developed by Folstein, Folatein and MeHug<sup>8</sup> was used. This Tool is composed of total 30 points including disorientation 5 points for time, that for place, memory registration 3 points, memory recall 3 points, concentration(attention), calculation 5 points, language function 7 points and understanding/judgment 2 points and it is analyzed that the more score is high, the more is cognitive function high. Reliability at the time of developing this tool was Cronbach's  $\alpha$ .86 and reliability of MMSE-K evaluation tool was .79<sup>10</sup>.

#### **Montreal Cognitive Assessment-Korea (MOCA-K)**

MoCA-K is a tool being prepared based on The Montreal Cognitive Assessment (MoCA) developed by Nasreddine<sup>11</sup> in order to sort out mild cognitive impairment through its modification, supplement, Korean

language translation and validity evaluation. This tool is composed of 7 areas including space execution power (5 question items), vocabulary (3), attention (8), writing skill (3), imagination (2), progressive recollection (5), disorientation (6) in order to evaluate general cognitive ability and based on full score of 30 points, difference of cognition depending on education level was compensated by adding 1 point of target who has education level below 6 years. This tool is an evaluation tool for sorting out mild cognitive impairment and its restricted line is below 22 points that means cognitive impairment. Reliability at the time of developing evaluation tool was Cronbach's  $\alpha$  .83<sup>11</sup> and that of MoCA-K that is translation tool was Cronbach's  $\alpha$  .81~.84<sup>10</sup>.

#### **Geriatric Depression Scale – Korea (GDS-K)**

In order to evaluate geriatric depression level, that was designed by Kee<sup>12</sup> through modification of developed by Yesavage and Sheikh to be matched with reality of our country was used. This evaluation tool is composed of total 15 question items including 5 items of positive form and 10 items of negative form. "No" to 5 items (1, 5, 7, 11, 13) of positive form becomes 1 point and "Yes" to remaining 10 negative items 1 point. Total score of 0-5 points is regarded as normal, 6-10 mild depression and 11-15 serious depression and the more score is high, the more gets depression level serious. In this study also, reliability Cronbach's alpha value was .85.

#### **EuroQol-5 dimensions (EQ-5D)**

In order to measure, compare quality of life of research targets, evaluation tool of EuroQol-5 was used. This evaluation tool is composed of EQ-5D utility value (EQ-5D index) and EQ-5D visual analogue scale (EQ-5D vas) comprising 5 question items asking present health condition and this is health related quality of life scale<sup>13</sup>. EQ-5D utility value evaluates 5 question items such as exercise, bathing, daily life activity, pain/inconvenience, anxiety/depression in 3 stages and score of answer of such items is estimated through estimation model for Korean quality of life<sup>14</sup>.

#### **D. Methods**

Progress of this study and data collection period was 3 months from June to August, 2014 and objective of the study was explained to test subjects before starting the test and a consent form for participation in the study was received from them. In the study, intervention period was 10 weeks and it was progressed based on 3 times/week and integrated dementia prevention program was directed to be performed for 60 minutes per 1 time. This program was performed by dividing it into detailed program of 4 types including physical activity (muscular strength, balance), meta memory class, reminiscence therapy, self-esteem training.

### **III. RESULTS**

#### **A. Changes in Cognitive Functions Before and After the Integrative Dementia Prevention Program**

Cognitive function change of test subjects who participated in integrated dementia prevention program is as shown in table 1. As evaluation score was significantly increased ( $p < 0.01$ ) in MMSE-K and MOCA-K that evaluate cognitive ability before/after participation in the program, cognitive function was shown to be improved.

Table 1: Comparison of Cognitive Functions before and After the Intervention Program

Evaluation	Pre-test ( $M \pm SD$ )	Post-test ( $M \pm SD$ )	<i>t</i>	<i>p</i>
MMSE-KC	28.04 ± 2.42	28.92 ± 1.38	-2.94	.007*
MOCA-K	24.21 ± 2.71	26.08 ± 2.60	-4.62	.000*

The values are mean ± standard deviation, MMSE-KC: Mini-Mental Status Examination, Korean version, MOCA-K: Montreal Cognitive Assessment, Korean version, \* $p < 0.05$  by Paired t test

**B. Changes in Depression Before and After the Integrative Dementia Prevention Program**

Depression change of test subjects who participated in integrated dementia prevention program is as shown in table 2. As evaluation score was significantly decreased ( $p < 0.01$ ) in GDS-K score that evaluates depression level before/after participation in the program, depression was shown to be decreased.

Table 2: Comparison of depression before and after the intervention program

Evaluation	Pre-test <i>M ± SD</i>	Post-test <i>M ± SD</i>	<i>t</i>	<i>p</i>
K-GDS	3.25 ± 3.32	1.25 ± 2.21	5.00	.000*

The values are mean ± standard deviation, K-GDS: Geriatric Depression Scale Korean Version, \* $p < 0.05$  by Paired t test

**C. Changes in Quality of Life Before and After the Integrative Dementia Prevention Program**

Quality of life change of test subjects who participated in integrated dementia prevention program is as shown in table 3. As evaluation score was significantly increased ( $p < 0.01$ ) in EuroQol-5D that evaluates quality of life before/after participation in the program, quality of life was shown to be improved.

Table 3: Comparison of quality of life before and after the intervention program

Evaluation	Pre-test <i>M ± SD</i>	Post-test <i>M ± SD</i>	<i>t</i>	<i>p</i>
EuroQol-5D	73.33 ± 10.49	81.67 ± 14.27	-3.92	.001*

The values are mean ± standard deviation, EuroQol-5D: EuroQol five dimensions questionnaire, \* $p < 0.05$  by Paired t test

**IV. DISCUSSION & CONCLUSION**

This study is a similar test research being performed based on pre/post design for a single group for exploring what is an effect of integrated dementia prevention program for the elderly of local community on geriatric cognitive function, depression, quality of life. When observing the result of this study, it could be concluded that integrated dementia prevention program showed a result of improving cognitive function ability, reducing depression and enhancing quality of life of normal elderly. This result was similar to the research result of Hwang, Yoon-Jeong and Chung, Won-Mi et al<sup>15</sup> and it could be concluded that providing the elderly with dementia or general elderly with diversified dementia-related program would enhance geriatric function. In view of above result, we have to develop diversified intervention programs for preventing dementia and it is expected that more systematic program would be developed and be widely utilized in the elderly of local community and each institution. As a limitation of this study, it is hard to generalize the result of this study as number of test subject was limited and it targeted only female subject.

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## A Study on the Real-time Patient Management Program Development and Usefulness in Angio-Intervention Room

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### Abstract---

**Background/Objectives:** The aim of this study is to improve internal customer satisfaction of the new EMR-based scheduling and viewing program in intervention room

**Methods/Statistical analysis:** Survey process was applied, before and after applying the new program, to 13 Radiological Technologist and nurses in angiography room and 70 ward nurses who have many interactions about interventions. Survey in the intervention room graded scale on 1 point to 10 point by 13 people. And 70 ward nurses fill in a Questionnaire by evaluating graded scale on from 1 to 5 point.

**Findings:** In program satisfaction survey, wards satisfaction increased from 2.76 to 3.04 ( $p < 0.001$ ) and intervention team satisfaction increased from 3.3 to 6.78 ( $p < 0.001$ ) after applying the program. Phone from the wards decreased from 8.2 to 5.2 ( $P < 0.002$ ) and intervention team workloads increased from 6.9 to 8.6 ( $P < 0.001$ ) after applying the program. The surveyed data were processed by computerized statistics using SPSS18.0 window. Ward survey results were analyzed by matched data analysis paired t-test, and intervention room survey results were analyzed by Wilcoxon signed rank t-test because of small sample size.

**Improvements/Applications:** Ward nurse and doctor satisfaction increased. Because they can easily search patient prepare, precaution and can search procedure time in real time after applying the program.

**Keywords---** Intervention Schedule Program, EMR Real Time Program Management, Procedure Schedule, Angio-Intervention Schedule, Angiography Intervention Schedule.

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## I. INTRODUCTION

To solve the contrarities mentioned in the background of the study, questionnaire surveys were conducted with 70 nurses of seven wards that request many tests and procedures to the intervention room of S university hospital intervention before and after application of the program. Since the operating rooms and intervention rooms of existing large domestic hospital do not open procedure (operation) schedules on-line in real time, attending physicians and nurses in charge of patients were experiencing many difficulties in relation to accurate explanations to patients and their protectors and in other various forms, their job satisfaction was quite low.

To solve such deficiencies, the program was developed and completed in collaboration with the medical information team in the hospital and was opened to the ward and the outpatient nurse room on-line in real time. Questionnaire surveys will be conducted with ward and intervention room workers before and after application of the program to examine how much their customer satisfaction increased and since high job satisfaction eventually shows high correlations with customers' loyalty to and preference for the medical institution, the effect that will make this program to be unprecedentedly supplied and propagated to the intervention rooms and operating rooms of university hospitals throughout the country is expected.

## II. LITERATURE REVIEW

Modern society can be said to be a society where if services are unsatisfactory and the customers do not feel satisfaction, they will not only not recommend the services to surrounding peoples but also advertise their dissatisfaction. Due to these problems, the society of today is called service society or service economy<sup>1,2</sup>. As one of important characteristics of modern society where we live, the rapid growth of the service field can be cited. Medical services are also one of service industries to provide intangible services to satisfy customers' needs. The fact that workers' job satisfaction is connected to patient satisfaction in the medical service field too has been identified in many studies. There are studies indicating that medical service workers' satisfaction and, out of it, nurses' satisfaction in particular shows high correlations with patients' satisfaction and their preference for medical institutions. In addition, in domestic studies too, it could be seen that when national university hospital workers' job satisfaction, patient satisfaction, and management performance were compared with each other, hospitals with higher job satisfaction showed higher patient satisfaction and management performance<sup>3</sup>. The intervention room of S university hospital in Gyeonggi-do is place where extremely diverse procedures are implemented with more than 500 and procedure names. While seeking for methods that can be used to identify and handle new materials and preparation items, and various complicated treatments before and after procedures more conveniently due to the diversity of various medical teams' procedures, taking note of the advantage of computerization, which is perfect, program development was initiated.

The past system in which patients' preparation items were informed to the ward nurses in charge by calling them through wire telephones and only those patients for whom the preparation has been completed were called through wire telephones to come down discarded and the system will be replaced by an online system. Currently, no university hospital in South Korea has any online system to inform expected time and current processes of progress of operation from working departments with uncertain expected required time such as operating rooms and similar tests or procedures under reservation systems.

The intervention room of the Department of Radiology is a place where tests and procedures for patients are performed. Since preoperative treatments and postoperative treatments are different for every patient in many cases and procedure times are also irregular, the ward undergoes quite some inconvenience in guiding patients and their protectors and in preparing preparation items for the intervention room. To relieve the convenience, the ward developed a program that enables inquiries of procedures in the intervention room in real time as well as preoperative treatments and postoperative treatments by patient and applied the program to work. How the real time procedure time inquiry program was introduced and how much internal customer satisfaction and customer satisfaction had been improved were surveyed. The production and application of the real time intervention room procedure schedule inquiry program (intervention patient management program) to the clinics are considered to harmonize well with the atmosphere of the full digital wireless hospital and this program was developed to make the hospital open more information to the employees and patients and improve the quality of its services so that all of the employees, patients, and protectors are satisfied. The intervention room of the Department of Radiology of S university hospital located

in Gyeonggi-do surveyed internal customer satisfaction and analyzed the results to find out points to be improved in the intervention room and conduct improving activities.

### III. PROPOSED WORK

#### A. Subjects and Method of Survey of Internal Customer Satisfaction

Questionnaire surveys were conducted with 70 ward nurses two times, one time before and one time after the development of the program. The subjects were the same for the two questionnaire surveys and each of the selection type questions was to select among 1 through 10 points full score in units of 1 point.

##### Ward Questionnaire Survey Subjects and Method

The questionnaire survey was conducted with 70 nurses of seven wards that request many tests and procedures to the this room and the subjects' clinical careers were 5 years or less in the case of 48 subjects, 6~9 years in the case of 15 subjects, and 10 years or more in the case of 7 subjects. The questionnaire consisted of contents regarding the degree of understanding of tests and treatments before and after procedure, satisfaction with methods of communication through wire telephone as with the previous system (on call system) and the new system (real time procedure time inquiry program), and other complaints and among nine questions in total, six were selection type questions and three were multiple choice type questions regarding sex, age, and work career [Table 1].

Table 1: Ward Questionnaire Survey Contents

Ward questionnaire survey items					
Gender	Work career			Age	
Male	6	1~5 years	3	20s	1
Female	7	5~10 years	6	30s	8
		10 years or more	4	40s	3
				50s	1
		Mean	8.69 years	Mean	38.8

##### Intervention Room Questionnaire Survey Subjects and Method

The questionnaire survey was conducted with 13 intervention room workers with clinical careers for 5 years or less in the case of three subjects, 6~9 years in the case of six subjects, and 10 years or more in the case of four subjects. The questionnaire consisted of three questions regarding satisfaction with the previous system to call patients to come down through wire telephone (on call system) and the new system (real time procedure time inquiry program), one multiple choice type question, and one descriptive question[Table 2]. The data from the questionnaire surveys conducted as such were statistically processed through computing using SPSS 18.0 for windows. The ward questionnaires were analyzed using paired sample T-test variance analysis and the intervention room questionnaires were analyzed using non-parametric Wilcoxon rank t-test variance analysis because the number of samples was small and the paired sample correlation coefficient did not follow normal distribution.

Table 2: Contents of Intervention Room Questionnaire Survey

Intervention room questionnaire survey items					
Gender	Work career			Age	
Male	0	1~5 years	48	20s	45
Female	70	5~10 years	15	30s	20
		10 years or more	7	40s	5
				50s	0
		Mean	7.36 years	Mean	36.7

#### B. Target and Method of Program Development

This author, one professor at the intervention room, and a radiological technologist participated in the development by requesting to one member of the medical information team and the program was made with an interface compatible with the existing EMR(electronic medical recording) system<sup>4</sup>.

Before the present program was developed, to see whether each patient is suitable for intervention procedures or falls under contraindications, patient's individual information was identified by accessing the EMR(electronic medical recording) system for the individual patient to inquire about various kinds of information and values.

However, the inquiry window of the newly developed program was applied with contents that can be identified very conveniently so that adverse effects such as the mechanism of contrast media, whether metformin is taken or not, GFR (glomerular filtration rate) values, and adverse effects and the details of infection in the alert window can be identified at a glance. Based on the results of the 1<sup>st</sup> questionnaire surveys conducted with ward and intervention room workers, the initial program was developed through several mistakes and errors and the program was completed through revising and supplementing work. In addition, through continuous upgrading, all added or deleted contents were reflected on and stored in the program to apply the program to procedure work<sup>5</sup>.

#### IV. CONCLUSION

In the surveys of program satisfaction, the score of satisfaction increased from 2.769 points before implementing the program to 3.040 points after implementation in the case of the ward ( $P < 0.001$ ) and increased from 3.3 points before implementing the program to 6.78 points after implementation in the case of the intervention room ( $P < 0.001$ ). Wire call volumes decreased from 8.2 points to 5.2 points after the development of the program ( $P < 0.002$ ) and the workload of the intervention room increased from 6.9 points before the application of the program to 8.6 points after the application of the program ( $P < 0.001$ ).

##### A. Results of Ward Questionnaire Survey

According to the results of the ward questionnaire survey, among the 70 subjects in total, 48 had careers not exceeding 5 years, 15 had careers of 6~9 years, and 7 had careers of at least 10 years so that the mean work career became 7.36 years. The mean age was 36.7 years and all the subjects were females due to the characteristics of nurses. The subjects of the questionnaire surveys before and after the development of the program were the same and mean satisfaction generally increased between before and after application of the program as follows; the mean satisfaction score of question no.1, "patients' inquiries of expected test time" increased from 1.97 points before opening the program to 2.52 points after opening the program, that of question no. 2, "Have you ever heard complaints from patients because you did not know procedure beginning time accurately?" increased from 1.84 to 2.11 points, that of question no. 3, "How many of pre-procedure preparation items do you know?" decreased from 3.61 to 3.50 points, that of question no. 4, "How many of post-procedure matters that require attention do you know?" increased from 3.62 to 3.77 points, that of question no. 5, "telephone call volumes" increased from 3.71 to 3.94 points, and that of question no. 6, "satisfaction with the on call system" increased from 1.84 points to 2.38 points [Table 2].

However, question no. 3, pre-procedure preparation items with a decrease in the score from 3.6143 to 3.5000 points and question no. 4, post-procedure matters that require attention with an increase in the score from 3.6286 to 3.7714 are contents well understood at normal times and the results are considered to be unsatisfactory because the original EMR program has an advantage of enabling the inquiry of the purpose of test (procedure) and matters that require attention. It could be seen that there was no particular event before and after the development of the program and the total mean increased from 2.769 to 3.040 points verifying that the program brought about quite some improvement [Figure 1]

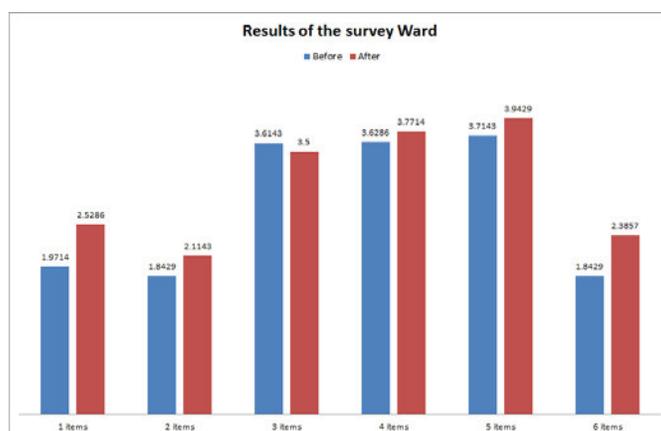


Figure 1: A Graph for the Results of the Ward Questionnaire Survey

Table 3: Paired T-Test (ward) of Questionnaire Surveys Before and After Development of the Program

Question	Program	Mean score (full score; 5 points)	Standard deviation	Standard error of the mean	Significance probability (P-value)
Question no. 1	Before	1.97	0.83	0.100	P=0.000
	After	2.53	0.91	0.109	
Question no.2	Before	1.84	0.93	0.111	P=0.001
	After	2.11	0.96	0.114	
Question no.3	Before	3.61	0.80	0.096	P=0.073
	After	3.50	0.78	0.093	
Question no.4	Before	3.63	0.75	0.089	P=0.040
	After	3.77	0.75	0.089	
Question no.5	Before	3.71	0.76	0.091	P=0.005
	After	3.94	0.78	0.093	
Question no.6	Before	1.84	0.81	0.097	P=0.000
	After	2.39	0.97	0.116	

**B. Results of the Intervention Room Questionnaire Survey**

The number of entire workers in the intervention room of S university hospital in Gyeonggi-do is 13 consisting of three with careers not longer than 5 years, six with careers of 6~9 years, and four with careers not shorter than 10 years and their mean age was 38.8 years.

Their mean work career was 8.69 years and of them, six were males and seven were females.

The overall results of the questionnaire survey conducted on six items; call volumes, procedure time, hand over time, workloads, occurrence of civil complaints, and satisfaction indicated improvement from 3.30 to 6.78 points and the difference was identified as being statistically significant at the significance level of  $P < 0.001$  through analysis.

However, the data were analyzed using non-parametric Wilcoxon rank t-test variance analysis because the number of samples was small and the paired sample correlation coefficient did not follow the normal distribution [Table 4].

The overall call volume score decreased from 8.46 to 5.23 points between before and after the application of the program and the procedure time related call volume decreased from 8.00 to 4.69 points ( $P < 0.002$ ) [Figure 2].

The work hand over score decreased from 5.15 to 4.77 points indicating that there was no particular difference while the intervention room workload score increased from 6.92 to 8.62 points between before and after the application of the program and the score for the rate of occurrence of civil complaints decreased from 7.46 to 4.15 points ( $P < 0.004$ ).

The intervention room employees' satisfaction score out of the full score of 10 points increased from 3.30 to 6.78 points between before and after the application of the program ( $P < 0.001$ ).

Table 4: Non-Parametric Wilcoxon Rank t-Test(Intervention Room)

	Call volume	Procedure time	Hand over	Workload	Occurrence of civil complaints	satisfaction
Approximate significance probability(P-value)	0.002	0.002	0.180	0.003	0.004	0.001

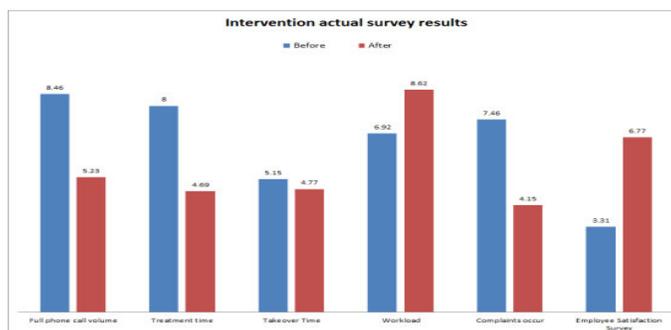


Figure 2: Graph of the Results of the Intervention Room Questionnaire Survey on Satisfaction

### **C. Program Development**

To relieve the existing one rousness of furnishing books to manually record patient books and dually preparing patient lists by writing patients records one by one on whiteboards, the real time procedure time inquiry and input program comprises a screen that enables the ward to inquire into the information input by the intervention room and a screen that enables the intervention room to inquire into and revise the information linked with the transfer program and the electronic notice board program.

In the case of inpatients, the information can be immediately entered by double-clicking the request to other department (Consult) with the inquiry function in the window below the "intervention room schedule registration" window or by entering the registration number.

However, in the case of outpatients or patients to be hospitalized later, the date should be selected to inquire about or enter information.

The screen was configured to enable inquiries by procedure field, that is, the abdominal system, the brain-nervous system, the chest system, the spinal system, the urinary system, the nonvascular system, and other regions and when a procedure has been received, a patient list is created at the bottom of the screen.

To enter a schedule, if the horizontal cell where the patient is shown in the list at the bottom, the relevant patient will be moved to the screen on the top and if procedures are aligned in order and stored, the procedures can be inquired in the ward.

The pretreatment and post treatment input screen and expected required times have basic values entered for every test or procedure name and these values may be changed in case necessary.

To be prepared for inquiries through wire telephone calls, the phone numbers of individual fields of the intervention room were added so that they will be shown in brackets when the patients under charge are clicked and the phone numbers were programmed to enable inquiries by ward as details.

In addition, the contents of matters requested input by the intervention room can be seen and when preparation for a patient has been completed, if 'preparation completed' is stored, the details will be indicated in blue in the preparation items cell on the intervention room so that procedure can be performed for prepared patients first.

In addition, the screen was also programmed to enable the ward to identify the pretreatment and prior preparation items for patients under charge so that the ward can prepare them in advance before the procedures.

This is a system that enables calling the patient immediately without the necessity to make wire telephone calls because when various kinds of prepared information on the patient have been entered, the will be seen in the intervention room.

The states of progression on the electronic information display board in the protector waiting room are divided into 'preparing', 'in procedure', 'being recovered', and 'being transferred' and when the transfer staff stores 'arrived' as soon as the patient arrived in the intervention room, 'preparing' will be automatically entered and 'in procedure', 'being recovered', and 'transfer requested' will be manually entered and stored by the nurse in charge.

When the state of progression of the procedure for a patient has been turned into 'in procedure', the time will be entered as the procedure beginning time so that the ward nurse can see the current process of progression of the procedure for the patient under her charge and can forecast the procedure finishing time to prepare for the next patient.

When the state of progression of the procedure for a patient has been stored as 'being recovered', procedure finishing time will be entered so that the ward arrival time of the patient after completion of the procedure can be forecasted and when 'transfer requested' has been entered, the patient transfer will be automatically registered in the transfer program so that the transfer staff can begin the transfer. The system was programed so that the patient name will disappear when the transfer to the ward has been completed.

Table 5: Details of Program Development (intervention room &amp; ward)

By applied room	Intervention room		Ward	
Item	By Cell	By icon	Entire screen	Preparation items and actions taken
Detailed items	Schedule	Calendar	Order of procedure	Pre-procedure preparation items
	Alert view	Room division	Current procedure state	Post-procedure matters that require attention
	Registration no.	Entire division	Procedure room	Comment entry window
	Name /Age/ Sex/ward	Division by part	Order	Fasting
	Diagnosis name	Notice	Beginning time	Denture removal
	Procedure 1	Patient transfer program	Finishing time	Written agreement
	Procedure text	Delete	Expected time required	IV Line
	Procedure 2	Refresh	Name	Skin pre
	preparation items	New	Registration no.	Foley cath.
	Time/Room	Revise	Ward	Underwear undressing
	Comment	Store	Sex/age	Whether any analgesic was administered
	Condition	Consult	Procedure name	Sandbag
	Entered by	Excel	Remark	ABR

**D. Details of Development by Intervention Room Cell**

- 1) Schedule cell
- 2) Alert view cell
- 3) Registration number (ID) cell
- 4) Name/Age/Sex/ward cell
- 5) Diagnosis name cell
- 6) Procedure 1 cell
- 7) Procedure Text cell
- 8) Procedure 2 cell
- 9) Time/Room cell
- 10) Comment cell
- 11) Condition cell
- 12) Enterer cell

**E. Details of Development by Intervention Room Icon**

- 1) Calendar icon
- 2) Large icons that can be divided by room
- 3) Division icon for entire rooms and by part
- 4) Notice icon
- 5) Patient transfer program icon
- 6) Delete/refresh/new/revise/store icon
- 7) Consult icon
- 8) Excel icon

**F. Development of the Ward Program**

- 1) Schedule inquiry
- 2) Pre- and post-procedure treatments and preparation items

**G. Electronic Display Board Program**

This program is interlocked with the electronic display board monitor in the protector waiting room and the condition cells of the schedule program in the intervention room to automatically update and show conditions such as preparing, in procedure, being recovered, and being transferred. To be prepared for cases where an emergency patient appears and the procedure order is changed, a program that enabling writing comments with the flowing characters at the bottom maximally considering customers.

## **H. Drug and Value Program**

### **Met Formin View**

Metformin is prescribed for type 2 diabetes as a primary drug because sugar is made even when no sugar has been taken, that is, during hunger information on patients with diabetes, hypertension, or hyperlipidemia that take Metformin was programmed so that it can be read from EMR (electronic medical recording).

### **Cr/GFR (Creatinine/Glomerular Filtration rate) View**

Creatinine is an element that is changed when proteins are at the highest value after performing large amounts of exercise and plays the role of delivering energy to cells in the body as with proteins. Since creatinine delivers energy almost only to muscles, it is frequently taken by those that perform fitness. Its chemical formula is  $C_4H_9N_3O_2$  and its value should be carefully watched since this value maintained high for long periods of time made bring about hypertension and diabetes.

Glomerular filtration rates are included in renal function tests and it is an indication of the degree of excretion of a certain substance through urine for 1 min. as the volume of the plasma that contains the substance. In the case of patients with problems in renal functions, the GFR value is very important before using the contrast medium and since GFR has great clinical significance for 1) the early detection of renal disorders, 2) the tracking of the progress of end phase renal disorders, 3) the evaluation of the appropriateness of alternative therapy for the kidney, and 4) the determination appropriate doses of drugs for which drug removal rates by the kidney are important, intervention rooms that use contrast made should pay great attention to GFR values. Therefore, the program was written to be capable of reading the values.

## **V. DISCUSSION**

After the development and application of program, ward nurses' and medical team's satisfaction was improved because test and procedure times can be inquired in real time from the ward and patients' preparation items and matters that required attention can be searched, inquired, and stored.

Intervention room workers felt that their workload increased because of one rousness of computerizing the contents that had been recorded manually before the development of the program but their satisfaction was improved remarkably by the time when the study was completed and the number of inquiring phone calls and the number of occurrence of complaints by patients and their protectors also clearly decreased. For many reasons as such, the program greatly helped communication with medical teams so that everybody's satisfaction was improved.

Therefore, departments that perform surgery, procedures, or other reserved tests of all university hospitals in South Korea should apply (open) programs as such to respond to patients and their protectors more accurately and kindly and to make efforts to relieve the fatigue of internal customers, that is, employees that are relatively vulnerable to external customers.

Since all programs enable downloading Excel data, the statistics of times required by professor for the same procedure name can be known but the disclosure of individual pieces of information as such is considered to be difficulties and since the flows of the waiting time before procedure and the recovery waiting time after procedure can be known, more efforts should be made to identify problems in long waiting time in order to enhance customer satisfaction.

The reason why the workload of the intervention room is felt to have increased on the contrary to the results of the study is considered to be that all employees think that they now should enter, revise, and inquire those prices of information that had been recorded manually on whiteboards by one person in charge in each room manually because the schedules of all patients have been computerized. Over time, the fact that this program is much more convenient and accurate will be recognized and this program will become easier to use so that satisfaction with it should be enhanced.

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# Study on the Plans for Improvement of Accident Compensation System for Public Officials in the Perspective of Fairness with Regular Laborers

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## Abstract---

**Background/Objectives:** There has not been much concern on accident compensation policy for public officials among policy-makers due to low cases of disasters and insurance benefit on an annual basis.

**Methods/Statistical analysis:** This study is intended to compare and analyze occupational health and safety insurance targeting on regular laborers with accident compensation policy for public officials and suggest issues and plans for improvement. In addition, this study aims to compare the degree of accident compensation provided to public officials and accident compensation offered to regular laborers seeking for plans to establish efficient accident compensation system.

**Findings:** For this, first of all, it is required to improve differentiated payment for survivor's benefit on duty during the period of service. Since compensation on disasters on duty is in the form of damage compensating payment, it is desirable to provide identical benefit as the damage is not different from the period of service. Secondly, there is a need to improve the guarantee of disability pension benefit with the one in the occupational health and safety insurance. Third, it is required to adopt disease compensating pension, funeral service expenses, and nursing benefits and other benefits from the occupational health and safety insurance in the accident compensation policies for public officials to acquire fairness with the one for regular laborers.

**Improvements/Applications:** There is a need to acquire fairness between public officials and regular laborers by equalizing the compensation system in the identical level with accident compensation level with regular laborers.

**Keywords---** Accident Compensation Policies for Public Officials, Accident Compensation Policies for Laborers, Disasters on Duty, Fairness, Disaster Benefits.

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## I. INTRODUCTION

Accident compensation policy for public officials has been adopted to pay an appropriate amount to public officials or their families if they are recuperated, become disabled, or die because of diseases or wounds on duty so that they are able to safely life by providing necessary resources. <sup>1</sup>

Accident compensation amount is paid to public officials or their families by the nation or local communities in the perspective of users if public officials are recuperated, become disabled, or die due to diseases or wounds on duty. This is a benefit in the form of social insurance policy for contributing to protect lives and improve welfare of public officials and their families.

Current accident compensation policy for public officials has been integrated with Public Officials Pension Act, and Government Employees Pension Service is an operating organization. Accident compensation policy for public officials has been operated for government employees with relatively low chance of disaster. Therefore, there has not been much concern on accident compensation policy for public officials among policy-makers due to low cases of disasters and insurance benefit on an annual basis. Therefore, there have been few studies previously conducted in dealing with accident compensation policies for public officials as well as officially related statistical data.

Therefore, this study is intended to compare and analyze occupational health and safety insurance targeting on regular laborers with accident compensation policy for public officials and suggest issues and plans for improvement. In addition, this study aims to compare the degree of accident compensation provided to public officials and accident compensation offered to regular laborers seeking for plans to establish efficient accident compensation system.

## II. OUTLINE OF ACCIDENT COMPENSATION POLICIES FOR PUBLIC OFFICIALS

### A. Significance of Policies and Standards for Recognition of Disaster

Accident compensation policy for public officials has been adopted to pay an appropriate amount to public officials or their families if they are recuperated, become disabled, or die because of diseases or wounds on duty so that they are able safely life by providing necessary resources. This is a benefit in the form of social insurance policy for contributing to protect lives and improve welfare of public officials and their families. Standards for recognizing accident compensation are applied as follows in Table 1 according to Enforcement Ordinance of Public Officials Pension Act.

Table 1: Standards of Recognizing Accident Compensation for Public Officials

Enforcement Ordinance of Public Officials Pension Act	Major Contents
Article 11	- Diseases on duty
Article 13	- Accidents before or after public officials are on duty
Article 14	- Accidents occurred while commuting to work

According to the Article 11 of Enforcement Ordinance, disease is regarded to occur on duty in case of incidence of new disease or significantly deteriorated conditions of previous disease. In addition, according to Article 13 of Enforcement Ordinance, accidents occurred when public officials involved in preparatory or organizing behaviors needed for the duty before or after they are on duty or during break time or due to incomplete or recklessness of facility management that are required or obligated for move-in for public officials to perform their duty is recognized as wound or death on duty.

In addition, according to the Article 14 of Enforcement Ordinance, if public officials are wounded or die due to traffic accidents, falling accident, or other accidents if commuting to work in a normal route or while coming to or returning from work place, this is regarded as wound or death on duty that is relevant to the standards of recognition of accident compensation.

However, if public officials are wounded or die due to accidents on duty, there are exceptional provisions for not recognizing them as disasters on duty. According to the Article 12 in Enforcement Ordinance of Public Officials Pension Act, if public officials are wounded or die due to accidents occurred without significant cause-and-effect relationship with accomplishment of duty or intentional causes; they are not recognized as wound or death on duty.

### ***B. Types of Benefit for Accident Compensation Policies***

Accident compensation policies are to provide an appropriate amount for wound, illness, or disability from retirement, death, or duty of public officials contributing to stabilize lives of government employees and their families and improve welfare of them.<sup>2</sup> Types of benefit in accident compensation policies include a long-term benefit for guaranteeing income and short-term benefit in the form of subsidy. Short-term benefit includes the amount of recuperation on duty, one-time benefit for recuperation on duty, subsidy for accident, and four types of condolence money for death. Long-term benefit includes thirteen types including four types of severance amount, two types of disability benefit, six types of survivor's benefits, and retirement amount. Among these benefits, survivor's pension, survivor's compensation, disability pension, disability benefits, survivor's pension from disability amount, and recuperation benefit are relevant to accident compensation benefits.<sup>3</sup>

## **III. COMPARISON WITH OCCUPATIONAL HEALTH AND SAFETY INSURANCE FOR REGULAR LABORERS**

### ***A. Comparison of Recuperation Benefits***

Public official pension policy and occupational health and safety insurance policy are providing an amount of recuperation benefit needed for treatment of wound or disease of public officials (laborers) on disasters on duty (on work). Prior to revision of law in 2011, accident compensation policies for public officials had restricted the period of recuperation up to three years. However, law has been revised to extend the period of recuperation and support the benefits in case of re-occurrence of wound or disease or if continuous recuperation is required. Since accident compensation policy for public officials provides recuperation amount needed from re-convalescence in case of re-occurrence or deteriorated conditions after the treatment as occupational health and safety insurance has not limited the recuperation period in principles, it is of regulation improved with fairness of accident compensation between laborers and public officials. At last, public officials are able to recuperate until their wounds or diseases are completely healed (fixed symptoms) from disasters on duty in the accident compensation policies for public officials. Hereupon, policy has been improved without limiting the number of re-convalescence.

On the other hand, recuperation benefits on duty in the public officials pension policy recognize a period of more than a day for recuperation as convalescence on duty as a part of compensation. However, occupational health and safety insurance only provides accident compensation if more than four days are required for recuperation due to wounds or diseases. Therefore, cases with less than three days of recuperation period are excluded from the scope of accident compensation.

In addition, occupational health and safety insurance allows to provide treatment regardless of recuperation period if re-convalescence is required due to re-occurrence or deteriorated conditions of wounds or diseases. Even if re-convalescence is not required, laborers are eligible to have medical service required for treatment of wounds or diseases due to disasters on duty after recuperation period ends through diagnostic system for aftereffect in symptoms.<sup>4</sup> However, there is insufficient amount of institutional policies for supplementing recuperation amount including diagnostic policies for aftereffect in symptoms in public officials pension policy.<sup>5</sup>

### ***B. Comparison of Disability Benefits***

In the occupational health and safety insurance, disability benefit is paid according to the grades of disabilities if laborers become disabled due to wounds or diseases on duty. Occupational health and safety insurance classifies the disabilities into fourteen grades. In case of grades from one to three, it is obligated to provide disability benefits. In case of grades from four to seven, one of either pension or lump-sum payment is selected by recipient. In addition, pension is not provided in cases of grades from eight to fourteen, and only lump sum payment is provided. However, public officials wounded on duty are eligible to select either pension or lump sum payment regardless of grades of disabilities.

Disability payment in public officials pension policy is not limited to disasters on duty but to be made on the assumption of retirement. If performing the duty after returning to the position without retirement, disability payment is not provided. Since disability payment is provided on the assumption of retirement, there is no compensation on direct or indirect expenses occurring due to disasters on duty while public officials are in service.<sup>6</sup>

Comparing with them, regular laborers are guaranteed with disability payment in the occupational health and safety insurance for disabilities occurring from disasters on duty and are also eligible to receive disability pension from National Pension Policy for disabilities occurring in disasters not on duty. In order to receive disability benefit from the National Pension Act, disability grades shall be from one to four as regulated by the National Pension Act. Therefore, they only guarantee for severe disability. In addition, regular laborers experienced disasters on duty are eligible to receive 100% of disability payment in occupational health and safety insurance and 50% of disability pension if they are relevant to payment conditions regulated by National Pension Policy.

Disability grades in public officials pension act and occupational health and safety insurance are identical from grade one to fourteen. However, as for the amount of payment, 32.5% to 52% of the monthly income is provided from public officials pension act from grade one to seven, while the amount from 37.8% to 90% of the average income is provided in occupational health and safety insurance.

Relative gap in compensation amount in each grade of disability is analyzable when comparing the guarantee ratio in each grade versus the guaranteed compensation grade one. Table 2 represents the level of benefit in other grades while establishing the amount of benefit in grade one as 100. In public official pension, grade seven is guaranteed with the amount of grade one as the 62.5% of the benefit. On the other hand, grade seven is guaranteed with the amount of grade one as 41.95% of the benefit in occupational health and safety insurance.

Table 2: Proportion of Benefit in Each Grade in Disability Pension in Each Policy

(Grade 1 = 100)

Classification	Public official pension	Occupational health and safety insurance	Soldiers pension	National pension
Grade 1	100	100	100	100
Grade 2	93.75	88.45	93.75	83.3
Grade 3	87.50	78.12	87.50	66.6
Grade 4	81.25	68.09	81.25	-
Grade 5	75.00	58.66	75.00	-
Grade 6	68.75	49.86	68.75	-
Grade 7	62.50	41.95	62.50	-
Grade 8	56.25	-	-	-
Grade 9	40.00	-	-	-
Grade 10	43.75	-	-	-
Grade 11	37.50	-	-	-
Grade 12	31.25	-	-	-
Grade 13	25.00	-	-	-
Grade 14	18.75	-	-	-
Notes	Grade 14	Grade 14 (Lump sum payment for less than grade 8)	Grades 1~7	Lump sum payment for grade 4

### C. Survivors' Benefits

In the occupational health and safety insurance, survivors' benefit is provided to the families in case of death on duty.

If there is no recipient for pension, survivors' lump sum payment is provided. However, accident compensation policies for public officials have not paid the survivors' pension to survived families of the late public officials due to disasters on duty prior to revision of law in 2011 but only provided survivors' benefits and pension only if public officials working for more than twenty years died.

However, if public officials working for less than twenty years died on duty, survivors' lump sum payment and benefit were provided.

However, there was a disability survivor's pension policy in accident compensation policies for public officials. Therefore, 60% of disability pension that relevant public officials were eligible to receive was provided to survived families if public officials receiving disability pension due to disasters on duty deceased.

Due to lack of survivor's pension policy in accident compensation policies for public officials, it has not been feasible to practically protect minimum living expenses of survived families of public officials deceased on duty.

Therefore, law has been revised in 2011 adopting survivor's pension policy. Depending on the period of service, there was a difference on the amount of benefit in survivor's pension. In case of less than twenty years of service of public officials wounded on duty, 26% of the monthly income was provided. In case of more than twenty years of service, 32.5% of monthly income was provided as a part of improvement. (Table 3)

Survivor's pension in National Pension Policy provided survivor's pension as the 40% of basic pension amount in case of less than ten years with the benefit followed by 50% of basic pension amount in case between ten and twenty years, and 60% in case of more than twenty years depending on the period of subscription.

Table 3: Comparison of Compensation for Survived Families

Classification		Contents	Notes
Public officials pension	Disabled survivor's pension	60% of disability pension	Decease of benefit pension recipient
	Survivor's benefit	23.4 times of monthly income	Decease of public officials wounded on duty
	Survivor's pension	Less than 20 years of service: 26% of monthly income More than 20 years of service: 32.5% of monthly income	Decease on duty
	Condolence money for death	1.95 times of monthly income	Decease of public officials
Soldiers pension	Survivor's pension	70% of difference in the amount of retirement pension	Decease on duty
		55% ~ 65% of monthly compensation	Decease not on duty
	Condolence money for death	3 times of monthly compensation amount	Decease of soldiers on duty
Occupational health and safety insurance		52% of basic compensation pension	Addition of added amount on the basic amount

**D. Comparison of Other Benefits**

**Incapacity Benefits**

In the occupational health and safety insurance, 70% of average income of laborers under disasters is provided as an incapacity benefit during the period when they are unable to perform economic activities, while protecting laborers and their families. Comparing with them, public officials pension policy is only providing recuperation benefit on duty and lump sum payment of recuperation on duty during the period when they are recuperated due to disasters on duty.

In the public officials pension policy, expenses related to recuperation are guaranteed if government employees are recuperated due to disasters on duty. However, incapacity benefit needed for maintaining the lives of laborers and their families is not provided.

However, according to regulations of public officials compensation, it is specified that the entire amount of monthly income is to be provided during the leave of absence due to disasters on duty.

Since regulations in public officials compensation guarantee the incapacity benefit on disasters on duty, accident compensation policies for public officials is not providing duplicated amount.

**Subsidy Benefits**

In the public officials pension policy, disaster subsidy is provided. Depending on the severity of disaster, pre-determined amount is provided. In the occupational health and safety insurance, the amount relevant to 120 days from the average income is provided for funeral of laborers deceased due to disasters on duty.

When comparing the condolence money for death (1.9 times of monthly income) and funeral service expenses in the occupational health and safety insurance in the public officials pension policy, the amount in the occupational health and safety insurance is a bit higher.

Of course, condolence money for death is provided to public officials if they de cease regardless of duty as well as in case when their families die.

### ***Nursing Benefits***

In the occupational health and safety insurance, 38,240 Won is provided a day when constant nursing is required on those receiving the recuperation benefit after treatment. In addition, 25,490 Won is provided a day for frequent nursing.

There is no regulation to provide regular laborers nursing benefit in the accident compensation policy for public officials.

## **IV. PROBLEMS IN ACCIDENT COMPENSATION POLICIES FOR PUBLIC OFFICIALS AND PLANS FOR IMPROVEMENT**

### ***A. Suspension of Payment for Disability Pension in Case of Re-Convalescence***

Prior to revision of law in 2011, recuperation benefit in the accident compensation policies for public officials has been provided for three years including two years of period for providing benefit and a year of lump sum amount of recuperation. Afterwards, medical guarantee has not been provided. This was an excessive regulation on recuperation period of public officials wounded on duty causing an issue of fairness with regular laborers. Therefore, regulations on recuperating period were abolished that re-convalescence was provided only if there was a medical opinion for how active treatment was required due to deteriorated conditions or re-occurrence of wound or disease on duty.

In the accident compensation policies for public officials, there is no incapacity benefit policy for guaranteeing the income of public officials wounded on duty.<sup>7</sup> Benefit is provided up to three years and eight months due to sick leave or leave of absence according to regulations of compensation for public officials. However, if it exceeds three years and eight months due to long-term recuperating period, laborers in service are guaranteed only with recuperating expenses without income. It is difficult to expect full treatment if income is not guaranteed on public officials wounded on duty if they have family members to support. Therefore, there is a need to establish institutional means so that public officials wounded on duty are able to have enough recuperation by saving a part of income loss in the accident compensation policies for public officials in case of long-term recuperating period.

### ***B. Differentiated Application of Survivors' Pension on Duty from the Period of Service***

Prior to the revision in law in 2011, there was no survivor's benefit on decease on duty. In case of service for more than twenty years, survivor's pension was provided regardless whether it was on or not on duty. However, in case of decease on duty, revision in law has improved the policies for providing survivor's pension on duty.

Depending on the period of service, there was a difference of benefit amount of survivor's pension. In case of less than twenty years of service, 26% of monthly income was provided. In case of more than twenty years of service, 32.5% of monthly income was provided.

However, there is a need to review whether differentiated compensation according to the period of service is desirable on public officials in disasters on duty. This is because accident compensation on laborers is highly related to damage compensation. Therefore, damage cannot be different from death according to period of service. Therefore, it is not desirable to differently apply survivor's pension on duty according to period of service. It is appropriate to provide identical amount of survivor's compensation.<sup>8</sup> There is a difference on the amount for benefit of survivor's pension by dividing the periods into the one for more than or less than twenty years for soldiers pension.

In addition, compensation of survivor's pension is either 26% of 32.5% of monthly income. However, this amount is very low compared to the compensation of survivor's pension in the range from 52% to 67%. The difference of compensation on survivor's pension in occupational health and safety insurance has been different depending on whether they had family members to support. If there is one person with a right to

receive survivor's pension, 52% of the monthly income is provided. 57% of the amount is provided if there are two recipients followed by 62% for three recipients and 67% for four recipients.

### ***C. Lack of Disability Benefits in Case of Disasters Not on Duty***

Public officials are not eligible to receive compensation on disasters if they are not disorders from causes on duty.

In other words, disability benefit is only provided on disasters on duty for public officials. Regular laborers are guaranteed with compensation on disasters on duty in the occupational health and safety insurance and on disasters not only duty from the National Pension. Furthermore, if the disasters on duty are relevant to the grade of disabilities regulated by National Pension, disability pension is added on the amount from the occupational health and safety insurance that they are eligible to receive 50% of disability benefit.<sup>9</sup> It is desirable to prepare for regulations on disability benefits from disasters not on duty in the public officials pension act and maintain the fairness with regular laborers.<sup>10</sup>

### ***D. Lack of Rehabilitation Service and Benefit System According to Cash Compensation***

In the occupational health and safety insurance, overall rehabilitation system including medical, social, and career rehabilitation was established and equipped with a system for providing active rehabilitation service.<sup>11</sup> Measures for supporting rehabilitation to society have been prepared for injured laborers. However, if public officials are disabled, it is difficult to serve as a role of comprehensive policies as various rehabilitation benefits are not provided with disability benefit. There is a need to adopt and operate rehabilitation needed for making public officials wounded on duty to return to the original position or society. In developed countries, the importance of rehabilitation has been recognized in occupational health and safety insurance for regular laborers as well as accident compensation policies for public officials. Therefore, various programs have been developed and implemented.<sup>12</sup>

### ***E. Problems of Disability Pension with Low Guarantee***

As for the grade of disability benefit in the accident compensation policies for public officials, disability is in grades from one to three, and this is smaller than the benefit compared to the grade of occupational health and safety insurance. Disability benefits of the public officials (one to three grades) are between 52% to 45.5% of the monthly income, and the amount is from 90.1% to 70.4% in the occupational health and safety insurance. In addition, regular laborers receive benefit from the occupational health and safety insurance and National Pension in case of disasters. Therefore, they receive the amount after deducting 100% of disability benefits in the occupational health and safety insurance and 50% of disability pension amount. Therefore, disability benefit in the accident compensation policies for public officials is relatively lower than the disability pension amount from the occupational health and safety insurance and National Pension for regular laborers.

### ***F. Preparation for Disaster Compensating Policies from Independent Law***

Current accident compensation policies for public officials are regulated in the public officials pension act. Therefore, they are operated with public officials pension policies without fully reflecting the social demands on disasters compensation on duty. In order to swiftly reflect needs on the accident compensation for public officials wounded on duty, it is required to operate independent law on accident compensation for public officials. In Japan, accident compensation policies for public officials are operated by independent accident compensation law for government employees or for public officials in local areas. Policies are operated in the human resource department with national pension for public officials. For public officials in local areas, policies are operated in the independent accident compensation fund for public officials in local areas.<sup>13</sup>

### ***G. Preparation for Accident Compensation System Identical with Regular Laborers***

Accident compensation policies for public officials have a benefit amount lower than the ones for regular laborers in the occupational health and safety insurance, while the range to be supported with benefit is limited. Targeting regular laborers, occupational health and safety insurance was adopted in 1964 improving policies through revisions in laws thereafter and has been adjusted in social and economic changes. However, accident compensation policies for public officials are operated with public officials pension act with low frequency of occurrence. Therefore, it has been operated without improvement of policies. Hereupon, level of benefit and applicability of recipient are limited compared to regular laborers, and the level of guarantee is evaluated to be low. Public official pension policy provides a high level of guarantee on public officials

pension. Therefore, there has been an issue of fairness with regular laborers that policies are being improved for reducing the level of guarantee but increasing the burden on pension insurance premium. However, accident compensation policies for public officials are of a low level of compensation compared to regular laborers. Therefore, there is a need to improve accident compensation system that is identical or at least similar with the one for regular laborers for fair policies.

## V. CONCLUSION

As for the basic direction of improving accident compensation policies for public officials, it is required to establish accident compensation system based on independent accident compensation law for public officials and also the disaster compensation system that is identical with the one for regular laborers. It is feasible to swiftly react with needs on accident compensation for public officials wounded on duty and socio-economic changes through independent accident compensation insurance law for public officials. In addition, there is a need to acquire fairness between public officials and regular laborers by equalizing the compensation system in the identical level with accident compensation level with regular laborers.

For this, first of all, it is required to improve differentiated payment for survivor's benefit on duty during the period of service. Since compensation on disasters on duty is in the form of damage compensating payment, it is desirable to provide identical benefit as the damage is not different from the period of service. Secondly, it is required to actively adopt rehabilitation service for promoting the rehabilitation of public officials wounded on duty to the original position at work or society. Third, there is a need to improve the guarantee of disability pension benefit with the one in the occupational health and safety insurance. Fourth, it is required to adopt disease compensating pension, funeral service expenses, and nursing benefits and other benefits from the occupational health and safety insurance in the accident compensation policies for public officials to acquire fairness with the one for regular laborers.

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## A Study on the Career Preparation Behaviors and Stress Coping Strategies in Nursing University Students

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### Abstract---

**Background/Objectives:** The purpose of this study was to identify the status and relationship of career preparation behaviors and stress coping strategies for nursing students.

**Methods/Statistical analysis:** This study is a descriptive study that uses a convenient sampling. In regard to the data collection, this study targeted a total of 216 third and fourth year nursing students by utilizing a self-report questionnaire. The data was analyzed by using SPSS /WIN 20.0 program. Moreover, descriptive statistics, Pearson's correlation coefficients, t-test, ANOVA and Scheffé test were utilized.

**Findings:** As a result, this study found that those students of higher grades tended to do career preparation behaviors more often. Those students with a good economic situation, whose mother had a high educational level, tended to use stress coping strategies more often. Specifically, this study found more cases in which "social support seeking stress coping strategies" and "problem-solving centric stress coping strategies" were used. Moreover, this study also found that those who were satisfied with their major tended to use "avoidance-centric stress coping strategies" less frequently. There was a correlation between career preparation behavior level and stress coping strategies.

**Improvements/Applications:** In <30 words.

**Keywords---** Career Preparation Behaviors, Stress Coping Strategies, Career, Career Counseling, Coping.

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## **I. INTRODUCTION**

### **A. Necessity of Study**

A majority of students who choose nursing studies enter nursing department in the hope of becoming a nurse. Moreover, their employment rate is relatively higher than the other majors. Hence, nursing students tend to do career preparation behaviors less frequently as compared with students of other majors<sup>1</sup>. However, many new nursing programs and hospitals have opened in recent years. As a result, nursing graduates are also forced to do divers career preparation behaviors just like students of other majors. This leads to a high degree of stress among nursing students<sup>2,3</sup>.

The number of new nurses and registered nurses had increased by 5.24 % per annum from 2000 to 2012. The enrollment in nursing programs had increased by 70 % from 13,897 in 2000 to 23,619 (including those specially enrolled students) in 2013<sup>3</sup>. That is to say, nursing graduates may get a lot of stress in this fast-changing era. In particular, career related stress might have a huge negative impact on them<sup>4</sup>.

Career preparation behaviors refer to actual behaviors rather than cognitive or emotional behaviors. In other words, this is about how much an individual person is trying to do for determining a career and also how diligently this person is making behavioral efforts in order to achieve a determined career goal<sup>5</sup>. In regard to the prerequisites of career preparation behaviors, it is imperative to first get a proper understanding of what occupation one really wants. Then, it is required to identify what efforts will be needed to get a desired job. Lastly, it is required to make continuous efforts along with preparations for getting a desired job.

It has been reported that employment stress influenced the school life adaptation and health condition of nursing students who would find it relatively easy to find a job<sup>4</sup>. Those students who perceive a high degree of employment stress cannot have a healthy university life. Moreover, these students lack confidence, thereby having trouble preparing for employment reasonably<sup>6</sup>.

Furthermore, nursing students should acquire the national certification before graduation in order to get a job. That is, they experience a high degree of stress under psychological pressure in relation to the national examination.

Stress coping strategies refer to behaviors of consciously determining what kind of coping behavior will be shown when an individual persons unable to adapt to a given situation or when an individual person uses his or her adaptation ability excessively. Humans make all kinds of efforts to maintain their psychological balance and wellbeing by escaping from stress when they are under a stressful situation. Coping is a behavior to terminate a stressful situation<sup>7-9</sup>.

Hence, determining consciously what kind of coping measure to be taken can be referred to as a stress coping strategy. Each individual person has a different way of coping with stress. This is caused by a difference in coping strategies. In this regard, coping strategies perform an important role in increasing coping effect and helping individuals adapt<sup>5</sup>.

The universities conduct the employment guidance counseling programs for students who suffer from stress in relation to career. They help students develop an alternative for overcoming stress through counseling. However, there is not a sufficient degree of interest in the career preparation behaviors and stress coping strategies of nursing students.

Thus, this study aims to identify the status of career preparation behaviors and stress coping strategies for the third and fourth year nursing students. This would contribute to differentiating the career counseling for each student. Also, this would help identify the career related stress of nursing students.

### **B. Objectives of Study**

It would be possible to contribute to differentiation of career counseling for nursing students. Also, it would be possible to help prepare an alternative measure such as an adequate coping strategy as to career related stress that students are feeling.

Following are the specific research questions.

- 1) Is there any difference in the career preparation behaviors of nursing students depending on personal variables?
- 2) Is there any difference in the stress coping strategies of nursing students depending on personal variables?
- 3) Is there any relationship between career preparation behaviors and stress coping strategies for nursing students?

## **II. METHOD OF STUDY**

### **A. Subjects of Study**

In this study, the third and fourth years nursing students from University A that does not have a university hospital and University B that has a university hospital were sampled conveniently by utilizing the non-probabilistic sampling method.

The minimum required number of subjects for this study was calculated at 129 people when the effect size of mid-level was set at 0.25 and the significance level was set at 0.05 with 4 groups at the maximum for securing 95 % of statistical power for ANOVA using G\*Power 3.12 program. The number of subjects who gave consent to this study was 180. This is an adequate number of subjects considering the minimum sample size and the dropout rate of 20 %. A total of 216 people were used in the final analysis.

### **B. Tools of Study**

Career preparation behaviors used in this study consisted of a total of 18 questions based on the tool developed by Mi-ae Jeon (2006). Each question is based on the 4-point Likert scale with 1 point for "Never likely", 2 points for "Not likely", 3 points for "Likely" and 4 points for "Highly likely". A high score of career preparation behaviors means a high degree of career preparation behaviors. In contrast, a low score of career preparation behaviors means a low degree of career preparation behaviors. The reliability of this was Cronbach's  $\alpha$  0.904, which was similar to 0.88 at the time of development.

In regard to the measurement tool of stress coping strategies, this study utilized Korean-Coping Strategy Indicator (K-CSI), which was translated and validated by Hye-jin Shin and Chang-dae Kim (2002) based on the stress coping strategy indicator developed by Amirkhan (1990). This test indicates the degree of coping reaction after recalling one of the stressful situations in the past 6 months based on the 3-point scale (1 point for "Never done so", 2 points for "Done so rarely" and 3 points for "Done so very frequently". The sub-scale score was calculated based on the sum of the scores. Cronbach's  $\alpha$  was 0.857, which was similar to 0.84 at the time of development.

The Korean version of stress coping strategy test, which was translated for reviewing whether the stress coping strategy evaluation could be applied with intercultural validity in the Korean culture, was conducted with 279 Korean university students. As a result, similarly to the results of the original test, this test also confirmed the following three factors: social support seeking, problem-solving centric and avoidance-centric. The Korean version of stress coping strategy test is the self-report questionnaire with 33 questions, which consists of three sub-scales, each of which consists of 11 questions. There is a low degree of correlation between the sub-scales. As a result, it was evaluated that there was a mutual independence for each coping aspect along with factor matrix.

### **C. Data Collection**

As for the data collection, this study collected the data through the questionnaire from December 5 to 15 in 2014. The preliminary survey was conducted with 30 qualified nursing students before the main survey. In doing so, this study measured the understanding level of the questionnaire as well as the expected duration. The data collection was undertaken by the author of this study and one research assistant. To reduce the measurement error between the data collectors, the preliminary meeting was conducted. That is, this preliminary meeting was to get a proper understanding of the questions and keep consistency in the description of questionnaire. The purpose and intention of this study was explained to the subjects. Those subjects who gave written consent were instructed to fill up the questionnaire by themselves. The author of this study and the research assistant collected the questionnaires.

#### **D. Ethical Considerations**

The study plan was submitted to the Public Institutional Review Board designated by Ministry of Health and Welfare for ethical considerations of the subjects before the study was conducted. As a result of the review, this study was approved (P01-201409-SB-05-03). Those selected as a research subject received full description on the purpose and intention of this study. Also, they were guaranteed anonymity and confidentiality. They were also instructed that they did not need to answer in the questionnaire if they did not want to reveal their personal information. Moreover, they were given the contact information so that they could contact us anytime if they did not want to participate in this study even after the questionnaire was completed. The ethical aspects of the subjects were fully taken in account by sincerely answering to the questions that were not even relevant to the study.

#### **E. Data Analysis**

The data collected in this study was statistically computed by using SPSS/WIN 20.0 program.

Following is the data analysis method used in this study.

- 1) The descriptive statistics were obtained in relation to the research variables along with the general characteristics of subjects.
- 2) t-test and ANOVA (Scheffé test for post-verification) were utilized in relation to the differences in career preparation behaviors and stress coping strategies in accordance with the general characteristics of subjects.
- 3) Correlation analysis was conducted to examine the relationship between the career preparation behaviors and stress coping strategies of subjects.

Grades and career preparation behaviors were divided into three parts after frequency analysis. Those with a mean score of 3.84 to 4.5 in the previous semester were classified as "high" level, whereas those with a mean score of 3.5 to 3.83 were classified as "mid" level and those with a mean score of 3.5 or less were classified as "low" level.

In regard to career preparation behaviors, those with a mean score of 2.28 to 4.0 were classified as "high" level, whereas those with a mean score of 1.83 to 2.27 were classified as "mid" level and those with a mean score of 1.83 or less were classified as "low" level.

### **III. RESULTS OF STUDY**

#### **A. General Characteristics**

The general characteristics of the subjects are as shown in Table 1. The mean age of the subjects was 22.28 years old. The female students were 194 people (89.81 %) and the year students were 105 people (48.61 %). Those students attending the universities located in the non-capital region accounted for the largest proportion with 147 people (68.06 %). In regard to the grade, "high" level accounted for 27.78 % (60 people), whereas "mid" level accounted for 38.89 % (84 people) and "low" level accounted for 33.33 % (72 people). In regard to their high school, "small and medium sized city" accounted for 36.11 % (87 people), followed by "metropolitan city" accounted for 28.24 % (61 people). As for their satisfaction level for major, "Moderately satisfied" accounted for the largest proportion with 137 people (63.42 %). As for their residential status, "Living alone or living in a boarding house" accounted for the largest proportion with 143 people (66.20 %). As for their household economic level, "a monthly household income of KRW(Korean Won)3m to 5m" accounted for the largest proportion, followed by "a monthly household income of KRW1m to 3m" and "a monthly household income of KRW5m or more". As for the educational level for their father, "university degree or higher" accounted for the largest proportion with 111 people (51.39 %). As for the educational level for their mother, "high school diploma" accounted for the largest proportion with 127 people (58.80 %). As for their religion with the exception of "other", "Christianity" accounted for the largest proportion with 66 people (30.56 %).

Table 1: General Characteristics of Subjects (n=216)

Individual Factors		n(%)
Age		22.28±2.28
Gender	Female	22(10.19)
	Male	194(89.81)
Years of students	3	111(51.39)
	4	105(48.61)
Location of university	Capital region	69(31.94)
	Non-capital region	147(68.06)
Grade	High	60(27.78)
	Mid	84(38.89)
	Low	72(33.33)
Location of graduated high school	Capital	44(20.37)
	Metropolitan city	61(28.24)
	Small and medium sized city	78(36.11)
	Rural city	33(15.28)
Satisfaction level for major	Well satisfied	46(21.30)
	Moderately satisfied	137(63.42)
	Moderately dissatisfied	31(14.35)
	Well dissatisfied	2(0.93)
Residential status	Living with family	63(29.71)
	Living alone or living in a boarding house	143(66.20)
	Living with relatives	2(0.93)
	Dormitory	8(3.70)
Household economic level(per month)	KRW5m or more	54(25.00)
	KRW3m to 5m	80(37.03)
	KRW1m to 3m	76(35.19)
	Under KRW 1m	6(2.78)
Educational level of father	University degree or higher	111(51.39)
	High school diploma	94(43.52)
	Middle school diploma	8(3.70)
	Elementary school diploma	3(1.39)
Educational level of mother	University degree or higher	78(36.11)
	High school diploma	127(58.80)
	Middle school diploma	8(3.70)
	Elementary school diploma	3(1.39)
Religion	Catholic	25(11.57)
	Buddhism	17(7.87)
	Christianity	66(30.56)
	Other	108(50.00)

KRW=Korean Won

### B. Differences in Career Preparation Behaviors in Accordance with the General Characteristics

The results of the analysis on the differences in career preparation behaviors in accordance with the general characteristics of the subjects are as shown in Table 2. It was found that there was a statistically significant difference in career preparation behaviors depending on the grade ( $t=-3.73$ ,  $p<0.001$ ). That is to say, the fourth year students did career preparation behaviors more frequently than the third year students.

Table 2: Differences in Career Preparation Behaviors in Accordance with the General Characteristics

Individual Factors		N	Mean	SD	t/f(Scheffé)
Gender	Female	22	2.24	0.67	1.11
	Male	194	2.11	0.51	
Years of students	3	111	1.99	0.47	-3.73*
	4	105	2.25	0.55	
Location of university	Capital region	69	2.07	0.44	-1.14
	Non-capital region	147	2.15	0.56	
Grade	High	60	2.12	0.54	2.14
	Mid	84	2.04	0.46	
	Low	72	2.11	0.57	
Location of graduated high school	Capital	44	2.18	0.48	0.62
	Metropolitancity	61	2.05	0.53	
	Small and medium sized city	78	2.14	0.53	
	Rural city	33	2.14	0.57	
Satisfaction level for major	Well satisfied	46	2.21	0.58	1.61
	Moderately satisfied	137	2.11	0.49	
	Moderately dissatisfied	31	1.99	0.54	
	Well dissatisfied	2	2.56	0.55	
Residential status	Living with family	63	2.17	0.54	0.78
	Living alone or living in a boarding house	143	2.11	0.51	
	Living with relatives	2	2.17	0.16	
	Dormitory	8	1.89	0.60	
Household economic level(per month)	KRW5m or more	54	2.14	0.51	0.08
	KRW3m to 5m	80	2.11	0.55	
	KRW1m to 3m	76	2.11	0.51	
	Under KRW 1m	6	2.19	0.58	
Educational level of father	University degree or higher	111	2.12	0.51	0.27
	High school diploma	94	2.13	0.57	
	Middle school diploma	8	2.15	0.24	
	Elementary school diploma	3	1.85	0.20	
Educational level of mother	University degree or higher	78	2.09	0.51	0.88
	High school diploma	127	2.16	0.54	
	Middle school diploma	8	2.01	0.51	
	Elementary school diploma	3	1.76	0.23	
Religion	Catholic	25	2.01	0.52	1.16
	Buddhism	17	2.30	0.58	
	Christianity	66	2.09	0.56	
	Other	108	2.14	0.49	

SD=standard deviation; KRW=Korean Won

### C. Differences in Stress Coping Strategies in Accordance with the General Characteristics

The results of the analysis on the differences in stress coping strategies in accordance with the general characteristics of the subjects are as shown in Table 3. It was found that there was a statistically significant difference in stress coping strategies depending on the household economic level ( $F=4.16$ ,  $p=0.007$ ) and the educational level of their mother ( $F=2.89$ ,  $p=0.036$ ). That is to say, those students with a household monthly income of "KRW5m or more" used stress coping strategies more frequently than those students a household monthly income of "KRW1m or 3m". In addition, those students whose mother's educational level was "university degree or higher" are used stress coping strategies more frequently than those whose mother's educational level was "high school diploma" or "elementary school diploma".

Table 3: Differences in Stress Coping Strategies in Accordance with the General Characteristics

Individual Factors		stress coping strategies		
		Mean	SD	t/f
Gender	Female	2.13	0.26	0.89
	Male	2.08	0.27	
Years of students	3	2.07	0.27	-0.79
	4	2.10	0.26	
Location of university	Capital region	2.12	0.22	1.51
	Non-capital region	2.06	0.29	
Grade	High	2.05	0.29	0.57
	Mid	2.09	0.27	
	Low	2.10	0.25	
Location of graduated high school	Capital	2.10	0.23	1.98
	Metropolitan city	2.04	0.28	
	Small and medium sized city	2.13	0.25	
	Rural city	2.03	0.31	
Satisfaction level for major	Well satisfied	2.06	0.42	1.35
	Moderately satisfied	2.11	0.26	
	Moderately dissatisfied	2.00	0.27	
	Well dissatisfied	2.02	0.64	
Residential status	Living with family	2.10	0.25	0.16
	Living alone or living in a boarding house	2.08	0.28	
	Living with relatives	2.08	0.41	
	Dormitory	2.05	0.20	
Household economic level(per month)	KRW5m or more	2.18	0.26	4.16*(a>c)
	KRW3m to 5m	2.06	0.26	
	KRW1m to 3m	2.03	0.25	
	Under KRW 1m	2.22	0.29	
Educational level of father	University degree or higher	2.11	0.27	1.47
	High school diploma	2.05	0.26	
	Middle school diploma	2.00	0.14	
	Elementary school diploma	1.93	0.47	
Educational level of mother	University degree or higher	2.10	0.27	2.89*(a>b,d)
	High school diploma	2.09	0.26	
	Middle school diploma	1.97	0.17	
	Elementary school diploma	1.69	0.12	
Religion	Catholic	2.04	0.30	0.51
	Buddhism	2.13	0.23	
	Christianity	2.09	0.25	
	Other	2.08	0.27	

SD=standard deviation; KRW=Korean Won

\*P&lt;0.05

#### D. Comparison on Mean Difference Between the Sub-Scales of Stress Coping Strategies in Accordance With the General Characteristics

The comparison on the mean differences between the sub-scales of stress coping strategies in accordance with the general characteristics of the subjects is as shown in Table 4. "Social support seeking stress coping strategies" among the stress coping strategies were found to have a statistically significant difference in accordance with the satisfaction level of major ( $F=3.33$ ,  $p=0.021$ ) and the educational level of mother ( $F=3.75$ ,

p=0.012). That is to say, those who were “moderately satisfied” with their major were found to use social support seeking stress strategies more frequently than those who were “moderately dissatisfied” with their major. Similarly, those whose mother’s educational level was “university degree or higher” were found to use social support seeking strategies more frequently than those whose mother’s educational level was “middle school diploma”.

“Problem-solving centric stress coping strategies” among the stress coping strategies were found to have a statistically significant difference in accordance with the grade (F=3.33, p=0.038) and the household economic level (F=3.44, p=0.018). That is to say, those who were “moderately satisfied” with their major were found to use social support seeking stress strategies more frequently than those who were “moderately dissatisfied” with their major. Similarly, those whose household monthly income was “KRW5m or more” were found to use problem-solving centric coping strategies more frequently than those whose household monthly income was “KRW1m to 3m”.

“Avoidance-centric stress coping strategies” among the stress coping strategies were found to have a statistically significant difference with the satisfaction level of major (F=3.78, p=0.011). In other words, those who were “very satisfied” with their major were found to use avoidance-centric stress coping strategies less frequently than those who were “moderately dissatisfied” with their major.

Table 4: Comparison on Mean Difference Between the Sub-Scales of Stress Coping Strategies in Accordance with the General Characteristics

Individual Factors		Social support seeking stress coping strategies(M±SD)			Problem-solving centric stress coping strategies(M±SD)			Avoidance-centric stress coping strategies(M±SD)		
		M	SD	t/f	M	SD	t/f	M	SD	t/f
Gender	Female	2.34	0.47	0.780	2.38	0.38	0.093	1.67	0.36	-0.783
	Male	2.27	0.40		2.22	0.41		1.76	0.37	
Years of students	3	2.24	0.40	-1.319	2.22	0.41	0.463	1.73	0.39	0.566
	4	2.32	0.42		2.26	0.41		1.71	0.35	
Location of university	Capital region	2.32	0.37	1.029	2.29	0.36	1.271	1.74	0.36	0.406
	Non-capital region	2.26	0.43		2.21	0.43		1.72	0.38	
Grade	High	2.22	0.46	0.956	2.16	0.45	3.330* (a<c)	1.77	0.35	1.328
	Mid	2.31	0.41		2.21	0.36		1.74	0.36	
	Low	2.29	0.37		2.33	0.42		1.67	0.40	
Location of graduated high school	Capital	2.30	0.41	1.983	2.26	0.39	1.063	1.75	0.37	0.399
	Metropolitancity	2.23	0.39		2.20	0.43		1.68	0.40	
	Small and medium sized city	2.35	0.42		2.29	0.41		1.74	0.34	
	Rural city	2.17	0.42		2.16	0.40		1.75	0.40	
Satisfaction level for major	Well satisfied	2.32	0.42	3.328* (b>c)	2.28	0.44	2.049	1.59	0.34	3.778*(a<c)
	Moderately satisfied	2.31	0.41		2.26	0.40		1.74	0.37	
	Moderately dissatisfied	2.08	0.34		2.08	0.40		1.85	0.39	
	Well dissatisfied	2.00	0.13		2.05	0.06		2.00	0	
Residential status	Living with family	2.28	0.39	0.201	2.25	0.39	0.697	1.77	0.37	0.661
	Living alone or living in a boarding house	2.28	0.43		2.23	0.42		1.71	0.37	
	Living with relatives	2.14	0.58		2.64	0.00		1.45	0.64	
	Dormitory	2.19	0.24		2.20	0.41		1.75	0.46	
Household economic level(per month)	KRW5m or more	2.36	0.41	1.881	2.37	0.40	3.441* (a>c)	1.80	0.37	1.573
	KRW3m to 5m	2.23	0.39		2.19	0.42		1.74	0.35	
	KRW1m to 3m	2.25	0.43		2.17	0.37		1.67	0.38	
	Under KRW 1m	2.53	0.41		2.47	0.51		1.67	0.54	
Educational level of father	University degree or higher	2.33	0.43	1.306	2.26	0.43	0.463	1.75	0.34	1.132
	High school diploma	2.23	0.39		2.22	0.39		1.71	0.40	
	Middle school diploma	2.19	0.35		2.11	0.20		1.70	0.40	
	Elementary school diploma	2.15	0.59		2.27	0.48		1.36	0.40	
Educational level of mother	University degree or higher	2.34	0.45	3.756* (a>c)	2.27	0.42	0.556	1.70	0.33	1.958
	High school diploma	2.24	0.38		2.23	0.40		1.75	0.39	
	Middle school diploma	1.95	0.30		2.18	0.50		1.77	0.43	
	Elementary school diploma	1.79	0.23		2.00	0.09		1.27	0.09	
Religion	Catholic	2.19	0.46	0.722	2.15	0.49	1.281	1.77	0.36	0.804
	Buddhism	2.26	0.34		2.35	0.35		1.78	0.37	
	Christianity	2.33	0.42		2.28	0.41		1.67	0.34	
	Other	2.28	0.41		2.21	0.39		1.74	0.37	

M=mean; SD=standard deviation; KRW=Korean Won

\*P<0.05

**E. Relationship Between the Sub-Scales of Career Preparation Behaviors and Stress Coping Strategies**

The correlation between the sub-scales of career preparation behaviors and stress coping strategies is as shown in Table 5. The correlation between career preparation behaviors and “social support seeking stress coping strategies” was  $r=0.329$  ( $p<0.05$ ), whereas career preparation behaviors had a correlation of  $r=0.340$  ( $p<0.05$ ) with “problem-solving centric stress coping strategies”. The correlation between “social support seeking stress coping strategies” and “problem-solving centric stress coping strategies” was  $r=0.519$  ( $p<0.05$ ).

Table 5: Relationship between the Sub-scales of Career Preparation behaviors and Stress Coping Strategies

	Career preparation behaviors	Social support seeking stress coping strategies	Problem-solving centric stress coping strategies	Avoidance-centric stress coping strategies
Career preparation behaviors	1			
Social support seeking stress coping strategies	0.329*	1		
Problem-solving centric stress coping strategies	0.340*	0.519*	1	
Avoidance-centric stress coping strategies	0.037	0.26	-0.089	1

**F. Comparison of Stress Coping Strategies in Accordance with the Level of Career Preparation Behaviors**

To examine whether the mean score of career preparation behavior level and stress coping strategies is statistically significant, the mean difference of career preparation behavior level and stress coping strategies was conducted. As for the classification of career preparation behavior level, it was divided into three parts by conducting frequency analysis on the score of career preparation behaviors. 68 subjects were classified as a “high” level. The career preparation behavior score of these students was 2.28 points or higher. 75 subjects were classified as a “low” level. The career preparation behavior score was 1.83 points or less. The comparison on the mean difference between career preparation behavior level and stress coping strategies is as shown in Table 6.

The mean score (2.11) of “social support seeking stress coping strategies” of the students with a high degree of career preparation behaviors was lower than the mean score (2.43) of “social support seeking stress coping strategies” of the students with a low degree of career preparation behaviors ( $t=-4.78$ ,  $p<0.05$ ). In addition, the mean score (2.07) of “problem-solving centric stress coping strategies” of the students with a high degree of career preparation behaviors was lower than the mean score (2.38) of “problem-solving centric stress coping strategies” of the students with a low degree of career preparation behaviors ( $t=-4.84$ ,  $p<0.05$ ).

Table 6: Comparison of Stress Coping Strategies in Accordance with the Level of Career Preparation behaviors

Individual Factors		Social support seeking stress coping strategies (M±SD)	Problem-solving centric stress coping strategies(M±SD)	Avoidance-centric stress coping strategies (M±SD)
Career preparation behaviors	High(n=68)	2.11±0.40	2.07±0.44	1.68±0.33
	Low(n=75)	2.43±0.39	2.38±0.33	1.72±0.41
t		-4.78*	-4.84*	-0.77

M=mean; SD=standard deviation

\*P<0.05

**IV. DISCUSSIONS**

The purpose of this study was to identify the relationship between career preparation behaviors and stress coping strategies when nursing students conducted career preparation behaviors. Also, this study aimed to provide preliminary data so that the stress coping strategies of each individual student could be utilized in the career counseling for these students.

The mean score of career preparation behaviors of nursing students was 2.12 points. Hence, their degree of career preparation behaviors was found to be low. This was equivalent to "Done little" given that the scores of career preparation behavior test were as follows: 1 point for "Never done so", 2 points for "Done little", 3 points for "Done much" and 4 points for "Done very much". This result was consistent with the finding of the previous study<sup>5</sup> that the overall degree of career preparation behaviors among university students was low.

In regard to career preparation behavior level, the third year students had 1.99 points, whereas the fourth year students had 2.25 points. This result supports the result of the previous study<sup>10</sup> that students conduct career preparation behaviors more frequently as they advance to a higher grade. This result reflects the fact that nursing students ponder over employment more often as they advance to a higher grade. However, students have to invest a lot of time and efforts for their career. On that account, that students actively conduct career preparation behaviors as they get close to graduation may become a serious problem. Hence, it would be imperative to conduct a personalized career counseling so that students can actively conduct career preparation behaviors even when they are in a low grade.

The location of university did not show a significant difference in career preparation behaviors in this study that examined nursing students. This indicates that nursing students, unlike students with other majors who have hard time finding a job because of the location of their university, are not greatly concerned about the location of their respective university when they search for a job.

The significant individual variables for the mean stress coping strategies of nursing students are as follows: "household economic level" and "educational level of mother". Those nursing students who were from an affluent family and whose mother's educational level was university degree or higher use stress coping strategies more often in order to escape from stressful situations.

The most frequently used stress coping strategy among nursing students was social support seeking stress coping strategies, which had a mean score of 2.28 points, followed by problem-solving centric stress coping strategies with a mean score of 2.24 points. The lowest stress coping strategy was avoidance-centric stress coping strategy with a mean score of 1.73 points. This indicates that the third and fourth year nursing students tend to ask for help from their acquaintances or resolve a matter causing stress when they are in a stressful situation. In contrast, they tend not to avoid a problem or situation.

Specifically, those who were moderately satisfied with nursing studies used "social support seeking stress coping strategies" more often than those who were moderately dissatisfied with nursing studies. Those whose mother's educational level was high tending to ask for help more often when they were in a stressful situation. This finding is believed to reflect the relationship between mother and children in Korean society.

In addition, those who had poor grade were found to use "problem-solving centric stress coping strategies" more frequently than those who had good grade. Similarly, those whose household monthly income was high were found to use "problem-solving centric coping strategies" more frequently than those whose household monthly income was low. This reflects that students with good grade make less effort to analyze and solve stressful situations as compared with students with poor grade. In this context, it would be necessary to develop a personalized counseling program and coping strategy enhancement program.

Lastly, those with a high degree of satisfaction with their major tend to use avoidance-centric stress coping strategies less frequently. This reflects that those who are satisfied with their major tend to ask for help from external supporters or solve a problem actively when they are in a stressful situation. It is also possible to learn that if students believe nursing studies fit their aptitude, their confidence level increases. Furthermore, their early dropout rate decreases even after employment. This finding can be explained in such context. New nurses get to face a lot of stresses at once due to sudden environmental changes and immaturity. The previous studies have reported that those students who were satisfied with their major adapted better.

Career preparation behaviors, "social support seeking stress coping strategies" and "problem-solving centric stress coping strategies" had a positive correlation. In addition, "social support seeking stress coping strategies" and "problem-solving centric stress coping strategies" had a positive correlation. This indicates that those students with a high degree of active coping strategies might have a high degree of career preparation behaviors. Consequently, the students who tend to actively resolve a problem in a stressful

situation would conduct career preparation behaviors actively. Also, this proves that there is a close relationship between stress coping strategies and career preparation behaviors.

## V. CONCLUSION AND RECOMMENDATION

The purpose of this study was to examine the status of career preparation behaviors and stress coping strategies among nursing students and also to identify the relationship between career preparation behaviors and stress coping strategies<sup>11,12</sup>. Also, this study aimed to provide preliminary data so that could be used in the career counseling for students. This could be utilized as preliminary data for conducting personalized employment counseling and establishing coping strategies in relation to the employment of each student.

As a result of the study, the fourth year students conducted career preparation behaviors more often than the third year students. Those whose household monthly income was more than KRW5m and whose mother's educational background was university degree or higher were found to conduct stress coping strategies more often.

Among the stress coping strategies, those who were "moderately satisfied" with their major and whose mother's educational background was "university degree or higher" used "social support seeking stress coping strategies" more often. Those with poor grade and high household economic level used "problem-solving centric stress coping strategies" more often. In addition, those who were very satisfied with their major were found to use "avoidance-centric stress coping strategies" less frequently.

It was found that there was a correlation between career preparation behavior level and stress coping strategies. That is to say, there was a correlation between career preparation behaviors, "social support seeking stress coping strategies" and "problem-solving centric stress coping strategies".

The following recommendations are proposed based on the aforementioned results.

First, it is necessary to conduct a study that includes the concept of stress coping strategies when undertaking a study on career counseling.

Second, it is necessary to conduct a study as to the utilization of coping strategies that can be directly used in career counseling.

Third, it is necessary to conduct a study on a continuous basis in consideration of diverse personal internal factors along with family, social and environmental factors, which influence the career of students, in addition to the variables examined in this study<sup>13</sup>.

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## The Influence of Father's Parenting Behavior and Teacher's Behavior on Cyber Bullying

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### Abstract---

**Background/Objectives:** This study examines the influence of father's parenting behavior and teacher's behavior passing through adolescent's aggression and delinquency on cyber-bullying.

**Methods/Statistical analysis:** Adolescents attending school from 4th grade in elementary school to 3rd grade in middle school were surveyed by purposive sampling and a total of 495 surveys were used in the final analysis. The collected data was analyzed by SPSS 21.0 Program and AMOS 21.0 Program, and 'Bootstrapping methods' was used in order to strictly verify the variant's indirect effect's statistical significance.

**Findings:** Results show that first; teacher's helping behavior and adolescent's aggression and delinquency turned out to have a direct influence on cyber-bullying. Second, father's parental behaviors such as excessive expectation, neglect, and affection have a direct influence on cyber-bullying. Third, teacher's behaviors such as teacher's helping behavior and adverse feedback have a direct influence on adolescent's aggression and delinquency. Fourth, father's parental behavior and teacher's behavior passes through adolescent's aggression and delinquency and has an indirect influence on cyber-bullying.

**Improvements/Applications:** Based on these results, the mediation role of fathers and teachers on cyber-bullying has proved to be significant. The development of father's education programs and manuals taking action on adolescent's cyber-bullying are suggested.

**Keywords---** Father's Parenting Behavior, Teacher's Behavior, Aggression, Delinquency, Cyber Bullying.

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## I. INTRODUCTION

In the current society, cyber space has settled as a life space where adolescents can share various topics and communicate with each other and also acts as a place where they can enjoy games and their free time. The development of the Internet has made it easy for people to access and utilize information and knowledge for learning activities. It has enabled people to associate with a broader human network, which is considered as one of the advantages. On the other hand, alongside with the spread of smart phones, interaction through cyber space has increased and cyber bullying which is referred to violence occurred within and out of school has increased. The definition and range of cyber-bullying differs from researchers and institutes but public institutes define it as 'behavior that invades other's privacy or infringes other's rights and defamation etc. by using signs, literature, sounds, pictures and images through the information network system'<sup>1</sup>. Scholars explain it as 'behavior such as swearing, criticizing, expressing threats, spreading rumors, bullying and harassing that can cause the other party psychological and physical harm in a virtual space and use terms such as cyber-bullying, cyber-delinquency, and internet delinquency'<sup>2,3</sup>. These terms all refer to the violent and invasive behavior within cyber space and also implies the lack of mutual consent on how to define and perceive this phenomenon. The ratio of conventional school violence such as rip-offs and physical violence has decreased, whereas cyber-bullying and verbal violence using e-mails, smart phones or Social Networking Service (SNS) has increased<sup>4</sup>. The characteristics of cyber-bullying such as non face-to-face and anonymity exacerbate the pain of cyber-bullied victims. These victims express much more psychological anxiety and depression than teenage school violence victims, eventually leading them to commit self-injurious behaviors<sup>5</sup>. Also, as cyber-bullying assailant's ages are gradually getting younger, reckless behavior such as acknowledging cyber-bullying as some sort of play instead of a serious crime is prevalent. Harmful effects of online cyber-bullying and bullying throughout SNS is standing out as a serious social problem not only domestically, but in the western society as well. Domestic cyber-bullying is usually carried out through Kakao Talk or SNS instead of computer based cyber-bullying, and resultingly the fact that violence takes place only in school<sup>6</sup>.

Studies on cyber-bullying, relationship with delinquent peers<sup>7,8</sup>, experience of school violence<sup>2,8</sup>, parental behavior or parental bonding are seen as causal factors of cyber-bullying<sup>9</sup>. Especially the rising of double income households and education focused on university entrance has resulted in excessive expectation or indifference between parents and children. The lack of time they communicate with each other and spend together often blinds parents in finding signs of cyber bullying in their children.

On this Accordini & Accordini (2011) asserted the significance of parental roles concerning cyber-bullying as communication and interest within parents and children are directly related to cyber-bullying harms. Cyber-bullied victims are more likely to become perpetrators the weaker the parent's control over children are. Recently, the study of the relationship between same sex parents and adolescent's over-immersion of internet games<sup>11</sup> has empowered the assertion of the relationship between parenting behavior and cyber-bullying. The assertion that the relationship between same sex parents and children influence children's diligence in school life<sup>11</sup> is especially considered as a meaningful discovery as it acts as a natural cushion to prevent the over use of the Internet.

Traditionally, parental behaviors are considered as a crucial factor as it has a massive influence on adolescent's psychosocial development. After the society's structural change along with the family's structural change, father's roles are highlighted as much as mother's roles. Assertions concerning that the main cause of the increasing adolescent's delinquency problems are due to the absence of the father's role, emphasize the father's active role in child nurturing and socialization<sup>12</sup>. Thus, when the father is less interfering, permissive, and allows children's freedom, problematic behaviors are less likely to appear, but when controlling and rejective parenting behavior is shown children are more inter personally and verbally aggressive<sup>13</sup>. This is the reason why adolescents who are raised in controlling, suppressing, and undemocratic environments appear to have more psychological and behavioral problems than those who not are. Especially parent's negative nurturing behaviors increase children's rage and this reinforces aggression<sup>3,15</sup> which yields behavioral problems such as cyber-bullying. However, father's affectionate parenting behavior has a positive effect on children's socialization and autonomy, as well as forming a close relationship with high self-esteem<sup>13</sup>.

Moreover, when adolescent's aggression increases, negative behaviors such as violent behaviors and delinquent behaviors occur. Cyber environment, which is clearly different from reality, has a strong influence on perpetrating cyber-bullying because of its accessibility and anonymity<sup>14</sup>. Prior studies have proved that

victim adolescents can easily hide their identity and perform delinquency within cyber space showing that victims can always easily switch their roles as perpetrators<sup>2,16</sup>. This verifies that father's parenting behavior including adolescent's aggression and delinquency has an intimate relationship with cyber-bullying.

The significance of teacher's roles concerning adolescent's cyber-bullying is also emphasized as much as parental behavior. In the adolescence period, children spend much time in school with their peers and teachers, so the relationships with them are important factors in their school life. According to Richard et al. (2011), the relationship between teachers and students cause a negative effect on school violence, and assertions such as when the relationship between teachers and students are positive, student's aggression and occurrence of school violence are reduced<sup>18,19,20,21</sup> show that in the matter of adolescent's violence and problematic behaviors, teacher's role are crucial. Teachers not only provide intellectual improvement but influence student's emotional and social adaption as student's social supportive system they function as role models<sup>22,24</sup>. Thus, teacher's violent and disciplinary teaching methods are a dangerous factor in yielding student's violence. Teacher's verbal and psychological violence such as harassment, mockery, and swearing etc. aggravates student's emotional isolation, the possibility of problematic behaviors and violent behaviors. As proved, teacher's behaviors are more influential than official school rules or policies concerning school violence<sup>6</sup>. Acknowledging the influence of teachers on students, teacher's behaviors are an important aspect to consider.

Cyber-bullying is reported to trigger adolescent's depression, anxiety, diminish of confidence; so thorough studies and solutions to prevent individual and social damages from cyber-bullying should be devised. Though parental behaviors are reasons that may cause adolescent's delinquency and violent behaviors, there are not many prior studies on the relationship of parental behavior and cyber-bullying. There are especially rising assertions about father's parental behavior having a strong influence upon adolescents, but research is mostly only focused on the relationship of the mother and the child. Moreover, the significance of mediating factors of cyber-bullying as well as school violence are emphasized, but empirical research on studies that examine these factors are not conducted yet. Teacher's mediation role concerning violence problems inside and out of the school is especially emphasized but there are not many studies about this problem as well. Thus, finding the causal relationship among father's parenting behavior, teacher's behavior, and cyber-bullying is considered to be meaningful. Also, exploring the relationship of adolescent's aggression and delinquency with father's parenting behavior and teacher's behavior as well as the direct and indirect influence on cyber-bullying is expected to be helpful for preventing adolescent's cyber-bullying.

## **II. RESEARCH PROBLEMS**

This study aims to provide basic data for practice and policy solutions to prevent adolescent cyber-bullying and devise interventions by examining direct and indirect effects of father's parenting behavior on cyber-bullying experience for effective cyber-bullying prevention and preventing the recurrence of cyber-bullying.

Through what was discussed above, we suggest the following research problems.

Research Problem 1: What are the direct influences of father's parenting behavior and teacher's behavior on cyber-bullying?

Research Problem 2: What are the direct influences of father's parenting behavior teacher's behavior on adolescent's aggression and delinquency?

Research Problem 3: What are the direct influences of adolescent's aggression and delinquency on cyber-bullying?

Research Problem 4: What are the indirect influences of father's parenting behavior teacher's behavior on cyber-bullying?

## **III. METHODOLOGY**

### **A. Subjects**

The study's subjects are adolescents attending 4<sup>th</sup> grade in elementary school to 3<sup>rd</sup> grade in middle school located in Chungcheong, Gyeonggi province, and Seoul; survey method and purposive sampling was used. The surveys were conducted from February 21<sup>st</sup> to March 13<sup>th</sup>, 2016 and 520 surveys were collected back. A total

of 495 replies were used in the final data analysis excluding 25 replies that were thought to be inappropriate for the study.

## **B. Measurement Scale**

### **Cyber-Bullying**

In order to examine adolescent's cyber-bullying, questions relevant to cyber-bullying in the National Youth Policy Institute's panel survey on children and adolescents were revised and edited for measurement.

### **Father's Parenting Behavior**

Father's parenting behavior was measured by using the parental behavior scale developed by Huh(2004).

This scale is composed of 32 questions divided into 8 areas; supervision, rational explanation, inconsistency, excessive expectation, excessive interference, abuse, neglect, and affection. Out of these, we used excessive expectation, neglect, and abuse, which tested to be significant through regression analysis in the total analysis. Each question was made into a 4 point Likert scale ranging from 'Strongly Disagree' for 1 point to 'Strongly Agree' for 4 points. This scale's Cronbach's  $\alpha$  value turned out as .80, .78, and .88.

### **Teacher's Behavior**

In order to study how students perceive teacher's behavior, we used the Teacher Treatment Inventory edited and revised by Choi (2010) based on Weinstein et al(1982). This scale is composed of lower factors; teacher's helping behavior; teacher's adverse feedback and instructions, teacher's education and rule orientation, teacher's high expectation, more opportunities and granted selections, but teacher's helping behavior and teacher's adverse feedback was chosen for this study. 4 point Likert scale was used and results showed that the higher the score, the higher the teacher's helping behavior and adverse feedback. Cronbach's  $\alpha$  value was each .90 and .86.

### **Aggression and Delinquency**

To examine adolescent's aggression and delinquency, the Korean Youth Self Report (K-YSR) which was standardized by Oh, Hong, Lee (2001) based on the American child and adolescent behavior checklist invented by Achenbach (1991). This scale is composed of total 10 questions, 5 about delinquency and 5 about aggression. Each question was made into a 4 point Likert scale ranging from 'Not at all' for 1 point to 'Very Much' for 4 points and the higher the score, the higher the problematic behavior. This scale's Cronbach's  $\alpha$  value turned out as .79 and 0.86.

## **C. Data Analysis**

The study's collective data was analyzed through SPSS 23.0 Program and AMOS 23.0 Program. In order to examine the scale's validity and reliability, factor analysis was conducted and Cronbach's  $\alpha$  coefficient of internal consistency was calculated. To check the predicted direction and correlation of each variant, Pearson's product moment correlation coefficient was calculated. Also, path analysis was conducted by using AMOS 21.0 Program to verify this study's theoretical model. To thoroughly verify each variant's indirect effect's statistical significance, 'Bootstrapping methods' were used.

## **IV. RESEARCH RESULTS**

### **A. Correlation of Measurement Variables**

Analyzed correlations of the variants related to adolescent's cyber-bullying are shown in Table 1.

Cyber-bullying turned out to have a statistically significant correlation in father's excessive expectation ( $r=.13$ ,  $p<.01$ ), neglect ( $r=.21$ ,  $p<.001$ ), affectionate ( $r=-.21$ ,  $p<.001$ ), teacher's helping behavior ( $r=1.25$ ,  $p<.001$ ), teacher's adverse feedback( $r=.18$ ,  $p<.001$ ), aggression ( $r=.39$ ,  $p<.001$ ), and delinquency  $r=.36$ ,  $p<.001$ ) and each variants have a correlation in a theoretically fit direction.

However, father's excessive expectation with father's affectionate and expectation turned out to have no significant meaning. Also, correlation among independent variants all turned out to be under .80, so there seemed to be no problem in multicollinearity<sup>29</sup>.

Table 1: Correlation of Measurement Variables

	cyber-bullying	father's excessive expectation	father's neglect	father's affectionate	teacher's helping behavior	teacher's adverse feedback	aggression	delinquency
Cyber bullying	1							
father's excessive expectation	.13**	1						
father's neglect	.21***	.32***	1					
father's affectionate	-.21***	-.04	-.43***	1				
teacher's helping behavior	-.25***	.05	-.20***	.44***	1			
teacher's adverse feedback	.18***	.14**	.39***	-.26***	-.04	1		
aggression	.39***	.23***	.41***	-.37***	-.29***	.31***	1	
delinquency	.36***	.25***	.44***	-.38***	-.30***	.32***	.67***	1
M	1.63	2.34	2.14	2.54	2.44	2.12	2.02	2.10
SD	.86	.76	.83	.74	.59	.59	.78	.73

**B. Influence of Father's Parenting Behavior, Teacher's Behavior, Aggression and delinquency on Cyber-Bullying**

After verifying the path analysis of father's parenting behavior and adolescent's aggression and delinquency on cyber-bullying, results seemed to show that all models were fit as shown on Table 2. The original research model failed to fit the study so father's parenting behavior and teacher's adverse feedback was omitted and the research model was modified. The modified path model's fitness turned out as  $\chi^2=3.017(p>.05, df=1)$ , which proved that the data supported the model. Model fitness turned out as GFI= .998, TLI= 1.007, CFI= 1.00, and RMSEA=.001 showed to be an appropriate fit model for analyzing.

Table 2: Model Fitness of Father's Parenting Behavior, Teacher's Behavior, Aggression and Delinquency on Cyber-Bullying

		$\chi^2$	df	GFI	TLI	CFI	RMSEA
Cyber-bullying	Study Model	170.021	1	.932	-4.082	.819	.585
	<b>Modified Study Model</b>	<b>3.017</b>	4	.998	1.007	1.00	.001

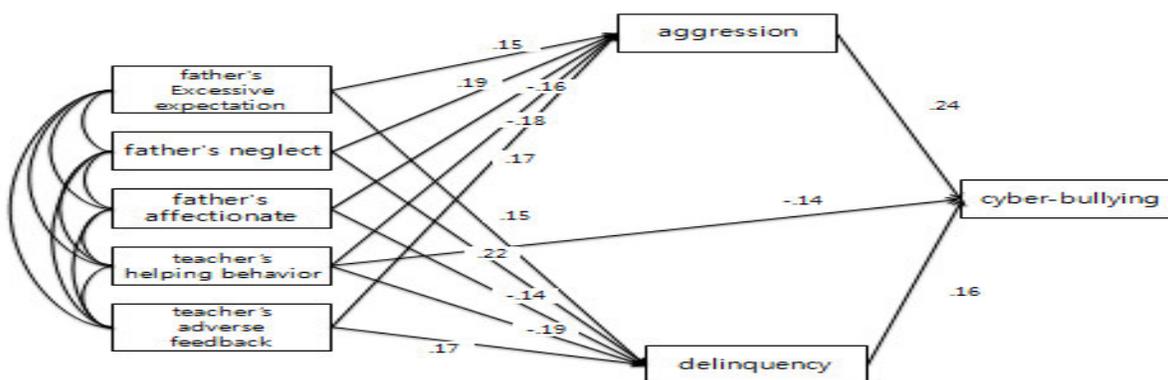
The analysis of the influence of father's parenting behavior and teacher's behavior as well as adolescent aggression and delinquency on cyber-bullying are shown in Figure 1 and Table 3, and the direct, indirect and total effect is shown in Table 4. Father's parenting behavior and teacher's adverse feedback does not have a direct effect in perpetrating cyber-bullying and teacher's helping behavior ( $\beta=-.14$ ), adolescent's aggression ( $\beta=.236$ ), and delinquency ( $\beta=.164$ ) turned out to have a direct effect on perpetrating cyber-bullying. Thus, the higher the teacher's helping behavior, the lower the adolescent's cyber-bullying perpetration.

Father's excessive expectation was shown to indirectly influence cyber-bullying ( $\beta=.061$ ) through adolescent's aggression and delinquency, father's neglect turned out to indirectly influence cyber-bullying ( $\beta=.081$ ) through adolescent's aggression and delinquency, and father's affectionate turned out to indirectly influence cyber-bullying ( $\beta= -.060$ ) through adolescent's aggression and delinquency. This can be analyzed that cyber-bullying is much more carried out when adolescent's aggression and delinquency elevates as the father's excessive expectation elevates, and when father's neglect is higher, adolescent's aggression and delinquency gets higher, leading to the elevation of cyber-bullying. Meanwhile, the higher the father's affectionate, the lower the adolescent's aggression and delinquency, which leads to lower cyber-bullying perpetration; father's affectionate not only decreases adolescent's aggression and delinquency but also decreases cyber-bullying as well.

Teacher's helping behavior was shown to indirectly influence cyber-bullying ( $\beta= -.075$ ) through adolescent's aggression and delinquency, and teacher's adverse feedback turned out to indirectly influence cyber-bullying ( $\beta=.068$ ) through adolescent's aggression and delinquency. This means that the higher the

teacher's helping behavior, the lower the adolescent's aggression and delinquency, which leads to the decreasing of cyber-bullying perpetration. However, the higher the teacher's adverse feedback, the higher the adolescent' aggression and delinquency, which leads to increasing cyber-bullying perpetration.

Father's neglect had the strongest influence on both adolescent's aggression and delinquency and teacher's helping behavior turned out to be the following strongest influence, showing that aggression and delinquency has an indirect influence on cyber-bullying. Also, the variant that influences cyber-bullying the most turned out to be adolescent's aggression.



All coefficients are standardized and statistically significant.

\*\*\*p<.001, \*\*p<.01, \*p<.05

Figure 1: The Influence of Father's Parenting Behavior, Teacher's Behavior, Aggression and Delinquency on Cyber-Bullying

Table 3: Path Coefficient of the Model of Father's Parenting Behavior, Teacher's Behavior, Aggression and Delinquency on Cyber-Bullying

			regression weights	standardized regression weights	S.E.	C.R.	P
aggression	←	father's excessive expectation	.16	.15	.04	3.71	***
delinquency	←		.15	.15	.04	3.86	***
aggression	←	father's neglect	.18	.19	.05	4.01	***
delinquency	←		.20	.23	.04	4.85	***
aggression	←	father's affectionate	-.17	-.16	.05	-3.35	***
delinquency	←		-.14	-.14	.05	-3.10	**
aggression	←	teacher's helping behavior	-.25	-.19	.06	-4.33	***
delinquency	←		-.24	-.19	.05	-4.54	***
cyber-bullying	←		-.20	-.14	.06	4.12	***
aggression	←	teacher's adverse feedback	.23	.17	.06	4.04	***
delinquency	←		.20	.17	.05	-3.17	**
cyber-bullying	←	aggression	.26	.24	.06	4.27	***
cyber-bullying	←	delinquency	.19	.16	.07	2.95	**

\*\*\*p<.001, \*\*p<.01, \*p<.05

Table 4: Direct, Indirect, and Total Effect of Father’s Parenting Behavior, Teacher’s Behavior, Aggression and Delinquency on Cyber-Bullying

			direct effect	indirect effect (p-value)	total effect
aggression	←←	father's excessive expectation	.151		.151
delinquency	←←		.155		.155
cyber-bullying	←←		-	.061(.005)	.061
aggression	←←	father's neglect	.189		.189
delinquency	←←		.225		.225
cyber-bullying	←←		-	.081(.005)	.081
aggression	←←	father's affectionate	-.156		-.156
delinquency	←←		-.142		-.142
cyber-bullying	←←		-	-.06(.003)	-.06
aggression	←←	teacher's helping behavior	-.185		-.185
delinquency	←←		-.191		-.191
cyber-bullying	←←		-.136	-.075(.002)	-.211
aggression	←←	teacher's adverse feedback	.172		.172
delinquency	←←		.166		.166
cyber-bullying	←←		-	.068(.008)	.068
cyber-bullying	←←	aggression	.236	-	.164
cyber-bullying	←←	delinquency	.164	-	.236

\*\*\*p< .001, \*\*p<.01, \*p< .05

## V. CONCLUSION AND DISCUSSION

This study aims to provide basic data for practice and policy solutions to prevent adolescent’s cyber-bullying and devise interventions by examining the influence of father’s parenting behavior, teacher’s helping behavior, and adolescent’s aggression and delinquency on cyber-bullying. As a result, teacher’s helping behavior and adolescent’s aggression and delinquency turned out to have a direct influence on cyber-bullying. Results showed that the higher the teacher’s helping behavior, cyber-bullying turned out to be lower, but aggression and delinquency elevated cyber-bullying perpetration. This means that this study partially follows the study that teacher’s high support lowers cyber-bullying<sup>29</sup>, and confirms the study of Kim and Choi (2012) which proves that problematic behavior such as adolescent’s aggression and delinquency influences cyber-bullying. Throughout these results, teacher’s helping behavior has proved to be an important resource that mediates adolescent’s behaviors such as cyber-bullying.

Furthermore, father’s parenting behavior resulted to directly influence adolescent’s aggression and delinquency, but did not seem to have any direct influence on adolescent’s cyber-bullying behavior. Thus, adolescent’s aggression and delinquency elevates when father’s excessive expectation and neglect are high, whereas affectionate behaviors turned out to decrease adolescent’s aggression and delinquency leading to the result that father’s parenting behavior has a direct influence on adolescent’s problematic behaviors. This re-emphasizes the importance of father’s parenting behavior as it partially confirms prior studies that family support influences adolescent’s cyber-bullying<sup>29</sup>. Moreover, teacher’s behaviors have a direct influence on adolescent’s aggression and delinquency. Thus, higher teacher’s helping behavior lowers aggression and delinquency, whereas adverse feedback strengthens aggression and delinquency. This implies that teacher’s role is important in the matter of adolescent’s aggression and delinquency, and teacher’s active intervention is needed to prevent cyber-bullying in and out of school.

Last, parenting behavior and teacher’s behavior was found to influence cyber-bullying through adolescent’s aggression and delinquency. Thus, father’s excessive expectation, neglect, and teacher’s adverse feedback influences adolescent’s aggression and delinquency and elevates cyber-bullying, whereas father’s affectionate and teacher’s helping behavior decreases aggression and delinquency and lowers adolescent’s cyber-bullying. This can be interpreted that parent’s abusive behavior elevates adolescent’s aggression and

influences cyber-bullying<sup>31</sup> to reinforce cyber-bullying<sup>33,35, 36</sup>. Also, positive nurturing behaviors such as affection are understood to decrease problematic behaviors such as adolescent's aggression and delinquency and lower cyber-bullying. However, there are some who assert that adolescent's aggression does not directly influence cyber delinquency<sup>12</sup>, so further multidimensional research is needed.

Based on these results, the following implications are made.

The fact that parents, whom children meet ecologically from their birth, have a massive influence on children's growth and development is an established theory. However, it is true that domestically, there was only high interest in mother's parenting behavior and less focus on father's parenting behavior. This study implies the significance of father's role as much as mother's role in parenting, by proving that father's parenting behavior has a direct influence on adolescent's aggression and delinquency.

In addition, many scholars mention the importance of teacher's role, but apart from these assertions there are not many empirical researches about teacher's roles so there are limitations in providing information for teacher's intervention within adolescent's cyber-bullying. This study shows the relevance between teacher's roles such as helping behavior and giving adverse feedback, adolescent's aggression and delinquency, and cyber-bullying, which has found out that in matters of problematic behaviors such as cyber bullying, not only parental roles are significant but also teacher's active mediation roles are crucial as well.

The following suggestions are made through these results.

First, father schools should be activated so programs considering the child's life cycle for father's parenting education can be developed. Especially, programs that enable fathers who are unable to receive parental education due to work, to learn and receive education by using the Internet should be made.

Second, manuals that can take action to adolescent's cyber-bullying should be devised. As double income households have increased and children are spending more time in school with teachers than parents, teachers are an important asset in adolescent's health growth and development. Thus, the development and distribution of professional and systematic manuals that can protect the teacher's right and rationally solve adolescent's problems are expected to positive influence preventing cyber-bullying in and out of school.

However, this study lacks the research on the difference of father's parenting behavior based on gender and variants of the father's parenting behaviors such as abuse, excessive protection, and supervision etc. are not explored, as well as finding out the difference in cyber-bullying according to the father's sociodemographic variants are this research's limitations. These parts are to be verified in later researches.

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## An Investigation of Attachment Factors to Digital Product

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### Abstract---

**Background/Objectives:** Modern innovation technology is shifting toward human-oriented technology structure combining technology and emotion. In this context, to optimize user experience from users' perspective, it is necessary to understand consumers' usage experience and interaction between users and products in specific contexts.

**Methods/Statistical analysis:** We conducted interactive elements analysis through FGD. Of the user-product interaction factors collected via the survey, interaction services common in diverse brand products were extracted and classified. Then qualitative survey was conducted in order to analyze the effect interaction elements on the attachment. To evaluate the predictive power of the independent variables (satisfaction for four interactive factors: function\* person, function\*system, emotion\*person, emotion\*system) on the dependent variable of attachments (attachment, possessive attachment and experiential attachment), a multiple regression analysis was performed. Finally, IPA(importance-performance analysis) was performed to find out which service experience needs to have an improved.

**Findings:** It is necessary to form products and design systems based on the understanding of the relationship between product and consumer, which is formed based on the interaction with product and consumer usage experience during their possession of the product. Products should be designed to give positive and pleasant usage experiences to consumers and facilitate interaction with them in order to build consensus with user, let them attach special meaning to it and form a relationship of attachment. This study explores consumers' product usage experience and interaction with product to identify what kind of values consumers seek. By doing so, this study aims to identify how to structure a product and system to form emotional bond and attachment relations. Specifically, this study seeks to identify how users feel while interacting with products and which values they regard importantly in the experience of product. In doing so we present an alternative to design new products and systems supportive of developing more emotionally cherished digital products.

**Improvements/Applications:** Attachment is an essential factor for sustainable product. Designing and developing interaction experience enhance not only the practical value of a product but also its emotional value to form a relationship of attachment. Also, positive interaction is expected to improve product values, generate the sense of attachment to the product and expand product lifespan to improve the quality of user-product relationship.

**Keywords---** User-Product Interaction, Emotional Bond, Attachment, Consumer Value, Human-Oriented Technology, Sensible System.

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## I. INTRODUCTION

People use diverse digital products in their daily lives and majority of digital products are gradually replacing physical goods. Now, digital products not only provide indispensable functions in people's everyday life but also play a key role, just as physical goods, in helping them recall memories, represent their own identity and form social relationships<sup>1</sup>.

Nevertheless, we normally find it hard to regard digital products as precious as physical goods<sup>2</sup>. In many studies comparing physical goods and digital goods to find out which of them people valued more preciously<sup>2-4</sup>, without exception, most of the respondents found it hard to tell which digital products they valued more than physical products. Actual users, however, have an attachment to digital products, too, and such an attachment equally works on digital product and physical product<sup>5</sup>. In other words, just like people form an attachment for their teddy bears or baseball cards, they value their smart phones or laptops preciously and try to keep them carefully. As such, although multiple existing studies have proven that digital products, too, invite an attachment in the relationship with consumers<sup>2,6-9</sup>, users tend not to perceive own attachment to digital products. It is mainly because digital products do not form an attachment in the same way as that by physical products.

Unlike analogue products to which people form an attachment by using all of their five senses via interaction to build emotional connections, digital products can hardly give people any emotional experience. Also, digital products easily become outdated with new technology development so relationships are easily disconnected, making it hard for users to give any special meaning thereupon<sup>6</sup>. Such characteristics of digital products make users feel distanced. Consequentially, unlike analogue products, people do not regard digital products as something they should cherish and keep for a long time carefully, experiencing disturbance in emotional connection.

It is not that every product we use is equally important to customers. Some are kept for a while and easily abandoned while some others are too important for us to be replaced by anything else even after their lifespan<sup>2</sup>. The longer the pleasant and positive mutual relationships with users, the larger the product usability and significance become. And the relationship of attachment between user and product formed based on emotional bond makes a user actively try to find a way to maintain the relationships continuously. Also such a product can have a symbolic value to represent the user's identity through the interaction and ties with the user. In this way, the product value rises more than the function in itself<sup>10</sup>. However, products without such a relationship of attachment with users soon lose their value because of user indifference and careless use. Even before they fulfill their actual effectiveness, such products lose off their value and are easily abandoned<sup>11</sup>.

## II. LITERATURE REVIEW

### A. Consumer-Product Attachment

Schifferstein and Desmet<sup>12</sup> defined the attachment between consumer and product as the emotional bond felt by consumer on a product and established by product usage experience. The definition implies the existence of emotional relation between user and object. Kagan et al<sup>13</sup> explained that attachment was an intensive emotional link between two subjects and became permanent with time; and the isolation of such a relation accompanied stress and sadness.

A strong attachment is associated with intensive feelings such as connection, affection, love and passion<sup>14</sup>. In fact, people most frequently feel love toward their possessions with attachment<sup>15,5</sup>. Therefore, attachment toward product is different from satisfaction. Satisfaction is largely affected by product appearances and functions<sup>16</sup> but attachment is formed by the emotion felt by users in the interaction process with a product and pleasure felt by users as a result of usage experience<sup>14</sup>. In other words, users may be satisfied with excellent product function and performance itself or the effectiveness there from, but they do not form an attachment. Attachment is built only through special or amusing usage experience in not temporary but continued relationship. This indicates that while satisfaction is formed based on the evaluation judgment on product performances<sup>16</sup>, product attachment is an emotional bond generated as a product becomes special for a customer<sup>17</sup>. A user may feel satisfied with a product with average level of performances as expected. But the user does not develop any emotional bond since such a usage experience does not provide any special pleasure or amazing experience. Attachment can be formed only by meaningful usage experience and

relationship with the product. Thus, attachment can be viewed as a result of user-product interaction and is formed with time<sup>18,19</sup>.

Attachment toward a product is generally related to the desire to maintain a relationship or try to use a specific subject or product variants on the continued basis<sup>17</sup>. Since attachment brings users a desire to maintain a relationship and to avoid of negative feelings caused by relationship disconnection with a subject, it triggers relationship protective acts<sup>20,21</sup>. In this sense, the intensity of attachment can be assessed based on the propensity not to sell own product even at a proper compensation (price) or propensity not to abandon a product even after its lifespan<sup>22</sup>.

Moreover, customers tend to decide to replace such a product with a new product in the same brand based on their feeling about the existing product and experience of interaction with it<sup>14</sup>. If a digital product has come to be related to a user's memories and own identity, such a product forms an emotional attachment relation just like a physical product<sup>3</sup>. When it comes to the hardware, attachment works to make a user try not to throw it away and keep it constantly. When it comes to the software, attachment works as a key variable in product replacement to make a user choose a new product in the same brand.

### **B. Possession Attachment and Experiential Attachment**

Verbeek<sup>23</sup> divided attachment into the attachment toward a product itself and attachment toward what the product provides. Attachment of possession is formed as a user owns a product with special significance. It means a status where a person tries to continue to keep a product or object having a special meaning to himself or herself such as a generational family heritage, special object exchanged for friendship with a close friend, gift with a special meaning, or own elaborate craft. Therefore, attachment is defined as the disposition to continue to hold the right or control of one's own possessions. In most cases, the attachment of possession is related to common everyday goods or products, but for their symbolic significance, they have a matchless position. However, when the factor that formed the attachment disappears, so does the relationship with the product<sup>17</sup>. On the other hand, attachment of experience is developed when people pursue a specific act repeatedly such as stamp or coin collection or motor show participation. In this case attachment is formed by relevant product-oriented experience. That is, the attachment of experience is formed as a result of a specific behavior represented by the object and specific interaction with the product. Therefore, the attachment of experience toward a product indicates that emotional connection is established when a person keeps interaction with a specific product to continue to do the specific personally important behaviors or when a person accumulates rich experiences of personal importance by using the specific product. Since unique experience becomes one's own personal story, owning and using a product representing his or her special experience is a key factor for one's identity and self-expression.

The product symbolizing family tradition, long-accumulated social honor and position expresses the sense of belonging and social status. Collections, travel souvenirs, or goods bought in a flea market during travel represent one's past experiences and owning them means to own symbolic evidence. Such a symbolic value and proof of past experience in owning such goods induces personal and mental association to make people feel it important to own such a product itself. Usually, people form an attachment toward their personally special products<sup>17</sup>. And the attached products are generally viewed as very special and important<sup>20, 26, 15</sup>. Thus, the symbolic meaning of these products is connected to attachment and the more the memories associated with the product, the more positive the effect on attachment. So the attachment of possession increases with time<sup>10</sup>.

Moreover, attachment has a social value as an attachment to a product associated with one's precious experience helps the person share the experience with others and pursue exchanges<sup>32, 28, 33, 34</sup>. For instance, sky divers would take extra care of goods such as color coordinated parachute gear used for a specific set of experiences. And if sky divers identify others by the jumpsuits they wear, the jumpsuits have a social meaning of self-representation<sup>28</sup>. But, most of all, the attachment of experience is formed based on the hedonic value. Multisensory, fantasies, and fun experiences encourage people to seek hedonic values repeatedly, and this continued interaction adds more significance to the corresponding product<sup>10</sup>. However, when people seek such an experience less, they use the relevant products less often as well, possibly disconnecting the attachment relation with the products. Therefore, for constant interaction with product, it is necessary to maintain OSL continuously to reinforce product-related good memories.

Table 1: The Differences of Possession Attachment and Experiential Attachment

Classification	Possession Attachment	Experiential Attachment
Description	attachment toward a product itself	attachment toward what the product provides
Cause	Importance of ownership	OSL(optimal stimulus level)
Affect	Positive emotion	Hedonic consumption (fantasies, feelins, fun)
Strengthening factor	Represent past experience	Flow experience
Role	Self-extension	Self-expression
Consequence	Engagement	Know-how

### C. Consumer Value

Consumers make a purchase decision after reviewing whether a product is worth buying, whether they can enjoy a specific value by buying the product or service, and whether the price is reasonable for the value. Therefore, consumer value creation is not only a key factor for business success<sup>35, 36</sup> but also a prerequisite to create and maintain a competitive advantage<sup>37</sup>. Gale<sup>38</sup> explained that business can succeed by providing excellent consumer value, and therefore company try to deliver the best customer value to gain a competitive edge<sup>39</sup>. Especially in innovative technology development and its accompanied new product designing<sup>40, 41</sup>, consumer value creation is regarded as a key product development strategy while being utilized as a factor to develop customer loyalty and long-term relationships<sup>42</sup>.

In traditional study on value, consumer value was defined from the benefit-cost perspective<sup>43, 44, 45</sup>. The benefit-cost model defines value based on the gap between benefit that consumer expected and sacrifice taken to get it. Value includes a product's tangible/intangible attributes, evaluation on such attributes and the process of gain the benefit. In this perspective Woodruff<sup>39</sup> defines consumer value as consumers' perceived preference and evaluation on product attributes, performance of attributes, fulfillment of purpose of product use, and ease of product use. More generation from the benefit-cost perspective, consumer value is defined as the evaluation of what the customers gain(benefits, quality, worth, utility) from a product against what they pay(price, costs, sacrifices) to buy and use the product<sup>38, 46</sup>.

However, the consumer value of digital product is not created by any product attribute itself or benefit at the purchasing point. Although a new camera with new technology is released to the market, it is not that these cameras include any value. Only consumers can realize its values by installing corresponding programs, setting the device according to their needs and using it for their own satisfaction. From this perspective, product quality and consumer value are mutually different ideas<sup>47-50</sup>. Consumer value is not realized as a consumer buys a product but as the consumer utilizes it while feeling about its value and multiple emotions. Therefore, product value is defined as what a customer perceives while using the product<sup>39</sup> and interaction experience relatively preferred<sup>51-53</sup>.

The value perceived by a consumer while using a product includes the values felt by the consumer throughout the whole consumption period. So, consumer value changes dynamically according to not only the product or service itself, but also the time, place, and purpose of use<sup>46, 54-56</sup>. While using a product, its value felt by a customer may disappear during a specific period. Or, on the other hand, a new value may be created as well. New products with advanced technology may deliver value instantly at the moment of its purchase and use by a consumer; whereas products with memory and nostalgia can have a special symbolic meaning with the time of possession.

As such, consumer value is formed by consumer-product (user-object) interaction. Depending upon user and purpose of use and situation of use, different values can be preferred and these preferred values can be mutually compared.

## III. RESEARCH METHOD

### A. Stimulus Product

Other products, product category, or the individual use shows different type of attachment<sup>10</sup>. It is possible that each other affections are working in the form of developments. In that reason, we chose a smart phone

for the study in order to minimize the experience variation. Attachment is closely related to the availability and physical proximity<sup>5</sup>. In other words, frequent interactions product such as an electronic clock or laptops is physically or psychologically rather than TV and games consoles and the former is more likely than the latter to make attachment. Moreover, Smart phones are usually located near at hand or in hand with the switch on and are more frequently used than any other devices. Besides, they are also used as camera and MP3 player and for access to the Internet and e-mail; they involve diverse interactions. Therefore, smart phones are among the most suitable products for researching patina as they are the devices with the most abundant accumulated trace from use.

### **B. Research Design**

First of all, to explore the smart phone-related interaction behavior, frequency of use and importance/satisfaction of them, the FGD was implemented in this study. According to smart phone brands, different services are provided; thus, the ratio of users of each brand was arranged mutually similar (Samsung – 3 persons, Apple – 2 persons, LG – 3 persons, Pantech – 1 person). Subjects were selected among the members with loyalty to each brand. The respondents were requested to list personally significant and important interaction services (instead of the services provided by applications) by focusing on the service of the product itself. And they explained the interaction, experience, and their behavior.

Of all interaction services collected and identified through FGD, we selected common interaction services provided by every kind of smart phones. A survey was implemented on the selected services to investigate their importance-satisfaction, attachment, emotion on service experience and value provided by such services. Survey data from 285 respondents were collected for qualitative research. As in the FGD, the number of survey respondent was arranged similarly among each brand and the male and female ratio was adjusted equally.

All items of each variable were operationally defined for the empirical analysis and then self-report questionnaire were developed based on that. All survey items were adjusted for the purpose of study on the basis of the scales that were used in previous researches. This research was conducted through online pay survey site with professional research company and we used statistical package program SPSS 18.0 for analysis.

## **IV. RESULTS ANALYSIS**

### **A. FGD Results**

We conducted interactive elements analysis through FGD. Of the user-product interaction factors collected via the survey, interaction services common in diverse brand products were extracted and classified. When requested to explain their interaction with the products, users classified interactions by focusing on what kind of benefits they could gain from the services provided by the products. That is, they explained interaction factors by classifying them based on the empirical criteria of cognitive aspects such as usefulness and usability; and emotional aspects such as aesthetic value and enjoyment. They also explained what kinds of behaviors they pursued in order to acquire and maintain such benefits. It is deemed that users' interaction activities are divided into active participating behaviors and passive receptive behaviors. In other words, in some cases users actively participate such as changing the smart phone wallpaper designs in line with their taste or downloading and installing applications for their own purposes of use. On the other hand, in some other cases, users did not intend active interaction but the product itself provided interactive services such as the auto phrase completion function or auto arrangement of last used applications.

In this sense, the smart phone-user interaction behavioral types can be classified according to interaction purpose and participation degree as in Table 2. One of them is the cases where users engage in active participation in product adjustment and alteration to meet their own taste while granting the product playful/symbolic significance. And the other is the cases where the products provide optimal customized system functions by patternizing user experiences or provide sensible fun and pleasure in interaction with users to reinforce the experience of amusement.

Table 2: Interactive Factors Classification

Factor1: function* person	Factor2: function*system
<ul style="list-style-type: none"> <li>▪ I can adjust the arrangement of background icons or group them.</li> <li>▪ I can set frequently-used apps as quick button for faster access.</li> <li>▪ If I enter my schedule, the product alerts me through a message.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The product automatically arranges last-used applications in order.</li> <li>▪ The product analyzes my texting patterns and show frequently used words.</li> <li>▪ If I plug in the earphones, the product automatically adjusts the volume to the previous decibel.</li> </ul>
Factor3: emotion*person	Factor4: emotion*system
<ul style="list-style-type: none"> <li>▪ I can change the smart phone wallpapers to the pictures or photos I want.</li> <li>▪ I can change application icons or folder designs.</li> <li>▪ The product has a photo editing function or story insertion function and photo sharing function.</li> </ul>	<ul style="list-style-type: none"> <li>▪ The product has several application icons looking like the shapes of actually used goods such as note or radio.</li> <li>▪ The product provides services through which I can log my daily activities such as daily schedule or exercise duration.</li> <li>▪ The product provides a conversation function such as Siri or S voice.</li> </ul>

### B. Survey Results

The survey was conducted in order to analyze the effect interaction elements on the attachment. To evaluate the predictive power of the independent variables (satisfaction for four interactive factors: function\* person, function\*system, emotion\*person, emotion\*system) on the dependent variable of attachments (attachment, possessive attachment and experiential attachment), a multiple regression analysis was performed.

#### *Descriptive Statistics of the Subjects*

Overall, 285 responses returned to us completed and usable questionnaires. Demographic configuration of the respondent used in this study are as shown in table2. The demographic characteristics of the respondents are: 50.9% males and 49.1% females; mean age is 31 years. Smartphone brands in the most widely used are Samsung, Apple, LG, Pantech in order and smart phone brands using the longest had similar order, Samsung, Apple, LG, Pantech, Motorola and Blackberry.

The main reasons of selection smart phones currently in use were ease of use, excellence in quality, and brand image in sequence.

Table 3: Breakdown of Respondents

Demographic categories	Range	Frequency	Percentage
Gender	Male	145	50.9
	Female	140	49.1
Age	10	12	4.2
	20's	139	48.8
	30's	68	23.9
	40's+	66	23.2
Smartphone brand currently in use	Samsung	122	42.8
	Apple	98	34.4
	LG	52	18.2
	Pantech	11	3.9
	etc	2	0.7
Reason of selection smartphones currently in use	Ease of Use	90	31.6
	Excellence in quality	54	18.9
	Brand image	47	16.5
	Originality of design	34	11.9
	Discriminatory performance	25	8.8
	Many people use	15	5.3
Smartphone brand using the longest period	Samsung	145	50.9
	Apple	65	22.8
	LG	50	17.6
	Pantech	18	6.3
	Motorola	2	0.7
	Blackberry	1	0.4
	etc	2	0.7

**Descriptive, Correlation and Reliability Analysis**

The results from the correlation analysis show that attachment and interaction elements are positively correlated.

All four dimensions of Interactions are positively correlated with attachment, possessive attachment, and experiential attachment.

All types of interactions are, as expected, highly inter correlated. There liability analyses of all variables entered into the calculations show that the Cronbach's  $\alpha$  coefficient are satisfactory for all variables and constructs(Table 5).

Table 4: Correlation Analysis

	<i>Attachment</i>	Satis. in Factor1	Satis. in Factor2	Satis. in Factor3	Satis. in Factor4
Attachment	1.000				
Satisfaction in Factor1: function*person	.300	1.000			
Satisfaction in Factor2: function*system	.345	.509	1.000		
Satisfaction in Factor3: emotion*person	.363	.474	.536	1.000	
Satisfaction in Factor4: emotion*system	.314	.344	.484	.444	1.000
	<i>Possessive Attachment</i>	Satis. in Factor1	Satis. in Factor2	Satis. in Factor3	Satis. in Factor4
Possessive Attachment	1.000				
Satisfaction in Factor1: function*person	.254	1.000			
Satisfaction in Factor2: function*system	.301	.509	1.000		
Satisfaction in Factor3: emotion*person	.301	.474	.536	1.000	
Satisfaction in Factor4: emotion*system	.234	.344	.484	.444	1.000
	<i>Experiential Attachment</i>	Satis. in Factor1	Satis. in Factor2	Satis. in Factor3	Satis. in Factor4
Experiential Attachment	1.000				
Satisfaction in Factor1: function*person	.298	1.000			
Satisfaction in Factor2: function*system	.322	.509	1.000		
Satisfaction in Factor3: emotion*person	.374	.474	.536	1.000	
Satisfaction in Factor4: emotion*system	.347	.344	.484	.444	1.000

Table 5: Descriptive and Reliability Analysis

	Cronbach's Alpha	Mean	Std. Deviation
Attachment	0.82	4.62	1.02
Possessive Attachment	0.72	4.42	1.19
Experiential Attachment	0.72	4.71	1.11
Satisfaction in Factor1: function* person	0.71	5.31	1.33
Satisfaction in Factor2: function*system	0.74	5.05	1.36
Satisfaction in Factor3: emotion*person	0.87	5.24	1.39
Satisfaction in Factor4: emotion*system	0.88	4.81	1.55

## V. DISCUSSION AND IMPLICATION

The survey investigated how the satisfaction with each interaction factor affected attachment and how much positive interaction contributed to form users' tie with product. As a result, differences were found in the influence of satisfaction with each interaction experience on attachment formation. Differences were also found in its effect on the formation of attachment in different dimensions (Table 5).

Regarding the general attachment, influence related to P3(emotion\*person) was found the strongest in attachment formation followed by P2(function\*system) and P4(emotion\*system). That is, active interaction showed the largest effect on attachment formation such as users' adjustment of partial smartphone settings, or saving their memos, diaries, photos, etc. in their smart phones. Users change the default main images provided generally by the manufacturers or ordinary photos to those satisfying their personality and usage purpose by adding own rich stories. In the process, they transform the product in line with their own taste and usage purpose. And while using the product (or in such a manner), it is estimated that they increase their psychological attachment to the product re-created by themselves.

On the other hand, P1(function\* person) showed no significant effect on attachment formation. Users adjust application arrangement or set quick buttons to improve their convenience of product use; and participate in interaction with product to utilize the 'push' function that alerts their schedule. As a result, users come to realize an optimized service functional configuration for themselves. Such an intended and active usage behavior of users induce user-centered service provision by the products, contributing to enhanced product performance and convenience. However, users' satisfaction with usability, convenience and functional performance may work favorably to positive product evaluation but it seems not to promote specific emotion, thus failing to form attachment.

Specifically, regarding the attachment of possession and attachment of experience, the former was found to have been affected the most by P2(function\*system) followed by P3(emotion\*person); and the latter, by P3(emotion\*person) and P4(emotion\*system) in order. It is deemed that users regard customized services as individual expansion, which are provided by the products after analyzing the repeated patterns of users' product use. And since such a product represent a user's unique pattern of device use, a symbolic value is added to the product and the product becomes the user's another self to form attachment. In other words, as for the service, for example, that analyzes a user's texting patterns and shows frequently-used phrases, users are deemed to feel similarity and familiarity to the profound customer-tailored service that remembers their own way of speaking while increasing the sense of ownership. The case of P3(emotion\*person) showed strong influence in both the attachment of possession and attachment of experience and especially stronger influence in the formation of the latter. They change the default main image to their own photos or images with good memory or personal importance. Or they edit and save memos, photos, etc. Such behaviors not only have a symbolic value representing a specific event or memory but also deliver their own story and prove their past experience. In this manner, such behaviors deliver the kind of intimacy that has been maintained for a long time in the most humane and emotional manner (attachment of possession).

Moreover, to store one's memories is to record the person's individual record of transformation during the long period of growth from the past to present. Doing so enables users to leave their traces of life beyond the structural limitation of physical space. In this mechanism, the products become the rich source of users' personal stories. These behaviors seem to work the same way as the acts of collecting all of the photos and arranging them in a photo album; pulling up an album to recall the past; or collecting precious childhood goods in the box of memories; contributing to attachment formation.

Lastly, P4(emotion\*system) is an interaction factor connecting users' offline lifestyle with online lifestyle or analogue elements with digital forms. It provides a more improved way of interaction than the original product functions as the more the users use smart phones, the more the smart phones accumulate their usage patterns, remember their own individual usage patterns, and individualize functions to provide enhanced ways of interaction. In this relationship improved based on such accumulation, the attachment of experience is formed to become more willing to continue the interaction and strengthen personal significance of the product.

Table 6: Regression Analysis on Attachment

Attachment			
	B	β	t
Satisfaction in Factor3: emotion*person	.156	.213	3.221*
Satisfaction in Factor2: function*system	.121	.163	2.400*
Satisfaction in Factor4: emotion*system	.092	.140	2.197**
R <sup>2</sup>	.177		
adjusted R <sup>2</sup>	.169		
Possessive Attachment			
	B	β	t
Satisfaction in Factor2: function*system	.172	.196	2.962*
Satisfaction in Factor3: emotion*person	.169	.196	2.956*
R <sup>2</sup>	.212		
adjusted R <sup>2</sup>	.181		
Experiential Attachment			
	B	β	t
Satisfaction in Factor3: emotion*person	.160	.213	3.274*
Satisfaction in Factor4: emotion*system	.140	.208	3.413*
Satisfaction in Factor1: function*person	.096	.123	1.977**
R <sup>2</sup>	.185		
adjusted R <sup>2</sup>	.177		

**A. IPA Analysis**

In order to develop services encouraging a stronger attachment, it is necessary to find out which service experience needs to have an improved performance first. To this end, IPA was performed in this study.

IPA is an evaluation technique that assesses the pre-use importance and post-use satisfaction of each attribute in order to assess user satisfaction with a product or service then, simultaneously compares and analyzes the relative importance and achievement of each attribute. IPA method performs both expectation and satisfaction assessment at the same time to present the elements that must be improved, clearly showing the problems in its results. Quadrant I represents high importance but low satisfaction thus, intensive management is required. Quadrant II represents high importance and high satisfaction, requiring well-maintenance strategies. Quadrant III represents low importance and low satisfaction. Its management priority may be lowered. Quadrant IV represents low importance but high satisfaction. In this quadrant, it is necessary to remove unnecessary extra management or make the necessary improvements.

As you can see in Figure 1, the services requiring the most intensive management are those that store and analyze consumer behavioral information and provide customer-specific tailored interaction such as frequently-used phrase recommendation and sentence completion, or daily log of exercise hours or step count. Both services require customizing according to contexts. Their functions need to be diversified in line with usage purposes and intention. Otherwise, such a service would rather become the source of inconvenience on the contrary. Such inconvenience is caused frequently when a user does not want to store his or her device use patterns or has no intention to continue own previous usage patterns.

For instance, users use different forms of language when they text with friends about daily events by using online terms casually from when they text to a teacher or older people by using polite words. In this situation, the auto phrasing function could be a very convenient or very inconvenient function for different contexts and different users depending upon what kinds of vocabularies are stored. Therefore, it is necessary to analyze user environment of device use and contexts. By doing so, the general situation of interaction should be considered and further specified in customization process. In this manner, greater user convenience and satisfaction would be achieved<sup>57, 58, 59</sup>.

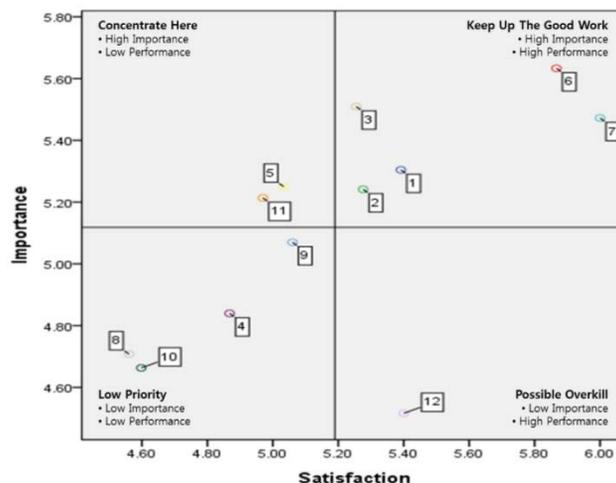


Figure 1: IPA Analysis

- 1) Adjusting the arrangement of background icons or group them.
- 2) Setting frequently-used apps as quick button for faster access.
- 3) The product alerts me through a message about my schedule.
- 4) Automatically arranges last-used applications in order.
- 5) analyzes my texting patterns and show frequently used words.
- 6) The product automatically adjusts the volume to the previous decibel.
- 7) Changing the smart phone wallpapers to the pictures or photos I want.
- 8) Changing application icons or folder designs.
- 9) A photo editing function or story insertion function and photo sharing function.
- 10) Several application icons looking like the shapes of actually used goods such as note or radio.
- 11) Providing services through which I can log my daily activities such as daily schedule or exercise duration.
- 12) Providing a conversation function such as Siri or S voice.

**B. Consumer Value**

The most important values in each interactive experience are shown in Table 7.

Table 7: Consumer Value of Each Interaction

function* person	function*system
<ul style="list-style-type: none"> <li>▪ Efficiency in life</li> <li>▪ Personalized service</li> <li>▪ Better looking appearance</li> </ul>	<ul style="list-style-type: none"> <li>▪ Personalized service</li> <li>▪ Efficiency in life</li> <li>▪ Improved quality and new function</li> </ul>
emotion*person	emotion*system
<ul style="list-style-type: none"> <li>▪ Emotional pleasure</li> <li>▪ Better looking appearance</li> <li>▪ Personalized service</li> </ul>	<ul style="list-style-type: none"> <li>▪ Efficiency in life</li> <li>▪ Personalized service</li> <li>▪ Emotional pleasure</li> </ul>

As the user environment of IT device use has shifted from PCs to mobile, smart phones have become the main part of individual devices. Furthermore, smart phones are even regarded as another self of users. Users, after buying a smart phone, install applications in line with their lifestyle or usage purpose. And for the convenience of use, they arrange the positions of frequently-used applications, categorize them according to similar types, and change application icons, etc. to adjust smart phone main pages. In this process, users develop product engagement and adjust product functions for their own purpose of use.

For better usability and convenience, they input their lifestyle information and pursue other activities as well to make participation and enhance product functionality. Thanks to such first-hand participation experience and its resulting service provision, users interact frequently with their products. And consequentially, smart phones become something valuable to users, which hold personal significance and

attachment. Therefore, enterprises need to give autonomy to users so they can change the default settings according to their own taste and purpose of use with a view to reinforce product-user interaction and product individualization for users to develop attachment to their smart phones as the product for their own while using them. This product individualization and personalization reinforces user-product relationship and make the product more significant as their other self.

Moreover, users' active interaction and engagement strengthen the joyful/symbolic meaning of smart phones. Smart phones accumulate users' device use patterns and provide customized user-centered services in line with their specific way of phone use.

In this manner, smart phones provide elevated usability and convenience to users than that given by their initial default functions. In addition, as users voluntarily store their log record, smart phones store abundant stories about their users.

Thus, smart phones become a medium of emotional communication that stores and bring back user experiences and memories, providing emotionally expanded functions. Also, the use behavior of sharing with others smart phone-saved user experiences and memories facilitates interaction with others and solidifies bond through digital product in real world. By doing so, such a behavior grants digital product a huge humane emotion.

Goods that personalized function as an identity symbol to indicate one's social position and prove its justification are important factors for self-expression. And in this mechanism, such goods are regarded as very special and important. Possessing goods associated one's past memories helps the person not to forget the experience and remember the memories to hold a special symbolic meaning. That is, specific objects or products representing one's experience come to have a symbolic significance to signify the time, place or situation of the certain specific piece of experience.

## **VI. CONCLUSION**

This study explored product attachment elements by analyzing the interaction between digital products and users and looked at what kinds of emotional factors had affected attachment. Also, based on interaction factors, this study identified the value types sought for by customers and presented value improvement factors for a stronger attachment and its specific methods.

First of all, by categorizing the types of user-product interaction, this study looked at the characteristics and nature of user-product relationship. Also, regarding digital products that can hardly be formed a close relationship of attachment with users, this study explained attachment formation factors in digital product by focusing on smart phones and explored the possibility of consumer relationship formation and further development. Lastly, product designing methods were studied to form a close tie with users by reinforcing the user-product interaction. It will be an essential factor for sustainable product designing to develop the kind of interaction enhancing not only the practical value of a product but also its emotional value to form a relationship of attachment. Also, positive interaction is expected to improve product values, generate the sense of attachment to the product and expand product lifespan to improve the quality of user-product relationship.

Attachment is formed as a user owns a product with special significance. It is viewed that attachment bases on repeated exposure or familiarity. And familiarity brings about deep knowledge on the corresponding product. Attachment is formed as a user owns a product with special significance. It is viewed that attachment bases on repeated exposure or familiarity. And familiarity brings about deep knowledge on the corresponding product. Moreover, attachment is the result of user-product interaction and established with time. Attachment makes a certain product dear to a user so, if product experience can be continued until a user accumulates plenty of product-related memories thus, gives it a symbolic meaning; that much of memories are attached to the product to sustain the attachment of experience. Attachment formation through enhanced product-user interaction experience is a process of making digital product to cherishable thing. Attachment makes a certain product dear to a user so, if product experience can be continued until a user accumulates plenty of product-related memories thus, gives it a symbolic meaning; that much of memories are attached to the product to sustain the attachment of experience and digital product would be an irreplaceable and indispensable thing as a result.

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## The Effect on Death Awareness and Attitude Before/After 'Thanatology' Education

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### Abstract---

**Background/Objectives:** This study was carried out to provide basic data in the future implementation of death education by conducting a survey.

**Methods/Statistical analysis:** The study targeted 209 college students who took thanatology-related classes of K College in one region for 16 weeks from March to June, 2015 and the survey was conducted over two times, before the lesson at the 1st week and after all the lessons of 16 weeks. The questionnaire was composed of general characteristics, awareness of death, dying knowledge and need for death preparation, importance and necessity of death education contents.

**Findings:** The research findings showed that importance and necessity scores perceived by the subjects increased after education in most of all 31 education contents. Before taking lessons, most students did not pay a particular attention to the importance and necessity of knowledge of death and death education. However, they answered became aware of the importance and necessity of death education and had the opportunity to seriously reflect on the issue of death after taking 'Thanatology' lessons for 16 weeks composed of systematic information.

**Improvements/Applications:** This study will be able to encourage individuals to find a solution to solve the death problem that will arise in the aging society more wisely.

**Keywords---** Death Education, Death Attitude, Hospice Palliative, Thanatology, Well-Dying.

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## I. INTRODUCTION

The problem of aging is the common problem of the developed countries where state-of-the-art medical technology is developed today. But the more serious problem of Korea is that aging is progressed too rapidly<sup>1</sup>. The limited life of humans in the 21st century is expected to be 120 years or 150 years and the advent of '100-year-old age' is predicted but not everyone can stay healthy in their old age. If we had to live an unhealthy life while living long, can longevity be a blessing? Although a great achievement of human development, aging is a reflection of the highly spiritual meaning approaching death day by day from the perspective of life.<sup>2</sup> In Korea entering an 'aged society' rapidly than any other country in the world, therefore, understanding and preparation for death can be said to be an urgently requested challenge for both society and individuals.

'Life' is more noble because it ends with 'death' and 'life' is more dignified because it disappears by death. Although not directly experiencing our own death, we experience death through the death of our acquaintances. Watching death leads us to deep self-awareness of how to live a life as a finite being. Lee Hoinacki, who applied cold-blooded criticism to death dependent on the modern medical system caught in technology, asked again "What is better legacy that can give to my children than experience watching you dying?"<sup>3</sup>. In fact, nothing is stronger than death awareness to change the overall attitude of life. When recognizing and accepting death as an extension of life, we can face dignified death as much as we desired to live a decent life.

Fortunately, the side claiming the dignified finish of life and side emphasizing bioethics have had a fierce debate for 19 years and as a result, so called 'well dying law' passed National Assembly Legislation Judiciary Committee and general meeting in January 2016 and is expected to be enforced in 2018 through the grace period. As this bill passed, 50,000 people per year are said to be able to end up their life naturally without life-prolonging treatment. No one will die after wearing a lot of modern medical equipment in the intensive care unit(ICU) or prolong their life in the ICU in the dying situation while spending their last period at home. Children will not have to allow life-prolonging treatment for their parents because of the attention of people around them.

How should we do in order to solve the aging problem of our society faced suddenly without preparation? To this end, it is to increase the understanding of death by carrying out death education targeting all ages as well as older people and discuss and study death from various angles<sup>4,5,6,7</sup>. In addition, it would be more desirable if the practice of leading people of the society showing an example of dignified death is follows like Cardinal Stephen Kim Su-hwan who refused life-prolonging treatment and left after donating corneas or Venerable Beop-Jeong who left a will to hold a simple funeral.

This study conducted a survey targeting college student samples taking 'thanatology' related lessons and analyzed it in order to find out the fact of hospice palliative care and death related awareness and attitude that can be said to be the best way for dignified death ahead of the enforcement of the 'well dying law'. We were to examine how the courses of death education including hospice palliative care would actually influence personal attitude regarding death awareness.

## II. MATERIALS AND METHODS

### A. Subjects

209 college students who took thanatology-related classes of K College in one region for 16 weeks from March to June, 2015 were selected as subjects. The survey was conducted over two times, before the lesson at the 1st week and after all the lessons of the 16th week.

### B. Analysis Method

For the analysis, a statistical program R was used. The questionnaire was constructed as follows: The general characteristics consisted of six items of sex, age, major, whether to live with family, religion, health status. Awareness of death was composed of six items such as to whom you should inform first that the patient is terminally ill?, Knowing in advance that the patient is terminally ill helps to stabilize and treat the mind of patients and caregivers? Do you think actions of the hospital for dying patients are sufficient? How much do you know about hospice palliative care? Who do you think mainly provides hospice palliative care? hospice type suitable for the reality of Korea. The need for dying knowledge and death preparation of the subjects was composed of funeral arrangements and method to cope with a situation after death, laws

relating to death, need for death preparation etc. The general characteristics of the importance and necessity of death education were compared and changes before/after education of the importance and necessity of death education contents were compared.

The education contents were composed of three aspects. Chi-square test was carried out for the need for general characteristics and death awareness, dying knowledge and death preparation of the subjects and importance and necessity by education content were averaged and higher scores were measured to be higher importance and necessity and three aspects and mean change before and after education were verified through paired t-test. Cronbach's alpha value is 0.944 and reliability of questionnaires was found to be high.

### III. RESULTS

#### A. General characteristics of subjects

The general characteristics of the subjects are as follows: Of total 209 people, women are 168 people (80.4%) and were found to be more than men (19.6%). In their age, those aged 19 or older is 57.4%, more than those aged 18 or younger (42.6%).

In the case of major, the health medical department accounted for the most, 97.6%. In whether to live with family, the percentage of responses of dormitory or living apart from their family is 66.0% found to be higher than 34.0%, the answer of living with their parents. In religious affiliation, the answer of no religion is 56.0%, more than 44.0% who answered they are religious. 96.2%, most respondents answered they are healthy to the question of asking the subjective health status of the subjects (Table 1).

Table 1: General Characteristics of Subjects

Classification	N(%)		Classification	N(%)	
Sex			Whether to live your family		
Men	41	( 19.6)	Dormitory or living apart from their family	138	( 66.0)
Women	168	( 80.4)	I live with my parents	71	( 34.0)
Age			Religion		
18 years old or younger	89	( 42.6)	No religion	117	( 56.0)
19 years old or older	120	( 57.4)	Religious	92	( 44.0)
Major			Health status		
Health medical department	204	( 97.6)	Healthy	201	( 96.2)
Others	5	( 2.4)	Not healthy	8	(3.8)
Total	209	(100.0)	Total	209	(100.0)

#### B. Subjects' Awareness of Death

The question of asking subjects' awareness of death showed the following results. In the question of 'to whom you should inform first that the patient is terminally ill?', the response of 'caregivers (family, etc.)' was the most, 41.6% before education but the answer of 'to both patients and caregivers at the same time' was found to be higher, 41.1% after education. In the question of 'knowing in advance that the patient is terminally ill helps to stabilize and treat the mind of patients and caregivers?', the percentage of 'yes' and 'strongly agree' was found to be 57.4% and 6.7%, respectively before education and that of 'yes' and 'strongly agree' to be increased to 74.2% and 13.4%, respectively after education. This also showed a statistically significant difference ( $p < 0.001$ ). In the question of 'do you think actions of the hospital for dying patients are sufficient?', the answer of 'NO' is 56.5%, higher than 'yes' 37.3% before education and the percentage of 'NO' was found to be higher, 61.7% after education, indicating that they think that the actions of the hospital are inadequate after education. This showed a statistically significant difference ( $p < 0.05$ ). The results of the question of 'How much do you know about hospice palliative care?' are as follows: Before education, the answer 'I've heard about it but I do not know well' 51.7% was found to be higher than 'I know to some extent' 40.7% but 'I know to some extent' was found to be high, 68.4% after education. This showed statistically significant difference ( $p < 0.001$ ). In the question of asking the subject providing hospice palliative care, nurses were found to be the most before education, 48.3% but family to be the most after education, 35.9% ( $p < 0.001$ ). In the question of asking hospice type suitable for the reality of Korea, 'type of separate hospice palliative care wards in a large hospital' was found to be the most, 29.7% before education but 'special hospital only for hospice palliative care patients' to be the highest, 37.8% after education, showing a difference before and after education. This also showed a statistically significant difference ( $p < 0.05$ ) (Table 2).

Table 2: Subjects' Awareness of Death

Classification	Before education		After education		Total		p-value
To whom you should inform first that the patient is terminally ill?							0.213 <sup>a</sup>
The patient himself/herself	53	( 25.4)	49	( 23.4)	102	( 24.4)	
Caregivers (family, etc.)	87	( 41.6)	74	( 35.4)	161	( 38.5)	
To both patients and caregivers at the same time	69	( 33.0)	86	( 41.1)	155	( 37.1)	
Knowing in advance that the patient is terminally ill helps to stabilize and treat the mind of patients and caregivers?							0.000 <sup>**a</sup>
Strongly agree	14	( 6.7)	28	( 13.4)	42	( 10.0)	
Yes	120	( 57.4)	155	( 74.2)	275	( 65.8)	
No	74	( 35.4)	25	( 12.0)	99	( 23.7)	
Not at all	1	( .5)	1	( .5)	2	( .5)	
Do you think actions of the hospital for dying patients are sufficient?							0.023 <sup>a</sup>
Strongly agree	3	( 1.4)	6	( 2.9)	9	( 2.2)	
Yes	78	( 37.3)	73	( 34.9)	151	( 36.1)	
No	118	( 56.5)	129	( 61.7)	247	( 59.1)	
Not at all	10	( 4.8)	1	( .5)	11	( 2.6)	
How much do you know about hospice palliative care?							0.000 <sup>**a</sup>
I know very well	3	( 1.4)	19	( 9.1)	22	( 5.3)	
I know to some extent	85	( 40.7)	143	( 68.4)	228	( 54.5)	
I've heard about it but I do not know well	108	( 51.7)	46	( 22.0)	154	( 36.8)	
I don't know at all	13	( 6.2)	1	( .5)	14	( 3.3)	
Who do you think mainly provides hospice palliative care?							0.000 <sup>**a</sup>
Doctor	26	( 12.4)	28	( 13.4)	54	( 12.9)	
Nurse	101	( 48.3)	64	( 30.6)	165	( 39.5)	
Social worker	28	( 13.4)	23	( 11.0)	51	( 12.2)	
Man of religion	7	( 3.3)	4	( 1.9)	11	( 2.6)	
Volunteer	2	( 1.0)	4	( 1.9)	6	( 1.4)	
Family	39	( 18.7)	75	( 35.9)	114	( 27.3)	
Others	6	( 2.9)	11	( 5.3)	17	( 4.1)	
Hospice type suitable for the reality of Korea							0.042 <sup>a</sup>
Special hospital only for hospice palliative care patients	54	( 25.8)	79	( 37.8)	133	( 31.8)	
Type of separate hospice palliative care wards in a large hospital	62	( 29.7)	48	( 23.0)	110	( 26.3)	
Type of operating one ward as hospice palliative care ward	19	( 9.1)	21	( 10.0)	40	( 9.6)	
Type of caring the patient at home by expert etc. visiting him/her	46	( 22.0)	44	( 21.1)	90	( 21.5)	
Type of experts providing hospice palliative care within aged care facilities	28	( 13.4)	16	( 7.7)	44	( 10.5)	
Others		-	1	( .5)	1	( .2)	
Total	209	(100.0)	209	(100.0)	418	(100.0)	

\*p&lt;0.05, \*\*p&lt;0.001

<sup>a</sup> : By Fisher's exact test.

### C. Comparison of the Importance and Necessity According to the General Characteristics

The awareness of the importance and necessity according to the general characteristics was analyzed and the results are as follows: The awareness of death education importance is men 2.85, women 2.99 after education, showing that importance perceived by women is higher. This also showed a statistically significant difference ( $p < 0.05$ ). In the necessity, 19 years old or older is 3.05 points before education, higher than 18 years old or younger (2.93 points) and this was statistically significant ( $p < 0.05$ ). In the major, the health medical department is 3.01 points, showing higher points than other departments ( $p < 0.05$ ) (Table 3).

Table 3: Comparison of the Importance and Necessity According to the General Characteristics

Classification	Importance				Necessity							
	Before education	±	p-value	After education	±	p-value	Before education	±	p-value	After education	±	p-value
Sex			0.050			0.049*			0.368			0.666
Men	2.96	±0.41		2.85	±0.43		3.05	±0.41		2.97	±0.38	
Women	2.99	±0.39		2.99	±0.38		2.99	±0.38		2.95	±0.34	
Age			0.751			0.884			0.019*			0.210
18 years old or younger	2.96	±0.38		2.97	±0.37		2.93	±0.37		2.92	±0.32	
19 years old or older	2.97	±0.41		2.96	±0.41		3.05	±0.39		2.98	±0.36	
Major			0.658			0.719			0.031*			0.072
Health medical department	2.97	±0.40		2.97	±0.39		3.01	±0.39		2.96	±0.35	
Others	2.88	±0.43		2.89	±0.42		2.65	±0.25		2.73	±0.21	
Whether to live your family			0.098			0.102			0.677			0.864
Dormitory or living apart from their family	2.93	±0.38		2.93	±0.37		3.03	±0.42		2.95	±0.36	
I live with my parents	3.03	±0.42		3.03	±0.42		2.99	±0.39		2.96	±0.33	
Religion			0.769			0.820			0.605			0.661
No religion	2.97	±0.41		2.96	±0.39		2.99	±0.36		2.96	±0.33	
Religious	2.96	±0.38		2.97	±0.40		3.02	±0.42		2.94	±0.38	
Health status			0.491			0.326			0.787			0.590
Healthy	2.96	±0.40		2.96	±0.39		3.00	±0.38		2.95	±0.34	
Not healthy	3.08	±0.47		3.15	±0.05		3.05	±0.48		3.04	±0.48	

### D. Changes in the Importance and Necessity of Death Education Contents Before and After Education

The importance and necessity by content of death education were measured before education and then, importance and necessity for the same education contents were re-measured after education and the results were as follows: The importance and necessity scores perceived by the subjects were found to be higher after education in most of total 31 education contents. In the contents of death education, the importance of 'modern society and death' was higher from 2.90 points before education and 3.06 points after education and the necessity was also found to be higher from 2.82 points to 2.99 points ( $p < 0.001$ ). Also in the education contents dealing with 'fear of death', the score of the importance got higher from 3.05 points before education to 3.26 points after education ( $p < 0.001$ ) and the necessity increased from 3.02 points to 3.16 points ( $p < 0.05$ ). In the contents about 'funeral culture', the importance was found to be 2.50 points before education but to be lower, 2.33 points after education and this showed a statistically significant difference ( $p < 0.05$ ). Also in the contents about 'tribute culture', the necessity average before education was 2.31 points while 2.13 points after education, indicating that the necessity decreased ( $p < 0.05$ ). The importance for 'communication of the person himself/herself' was measured to be 3.13 before education and was found to be increase to 3.25 points after education ( $p < 0.05$ ). The importance for 'funeral arrangements' increased from 3.05 points before education to 3.27 points after education and the necessity average was also increased from 2.99 points before education to 3.19 points after education ( $p < 0.05$ ). Education importance about 'death and acceptance' was found to decrease from 3.14 points before education to 2.97 points after education but the necessity to be increase from 2.93 points to 3.10 points ( $p < 0.05$ ). The importance on 'psychological healing - meditation music' was found to be 2.72 points before education and increased to 2.85 points after education. This showed also a statistically significant difference ( $p < 0.05$ ). The necessity of 'psychological healing-art therapy' and 'psychological healing - drama therapy' is from 2.80 points to 2.64 points and from 2.78 points to 2.64 points, respectively and the necessity after education was found to be lower ( $p < 0.05$ ). The importance average of 'near death experience-medical opinion' increased from 2.87 points before education to 3.04 points after education ( $p < 0.05$ ) (Table 4).

Table 4: Changes in the Importance and Necessity of Death Education Contents Before and After Education

Classification	Importance					Necessity				
	Before education		After education		p-value	Before education		After education		p-value
Modern society and death	2.90	±0.47	3.06	±0.55	0.000**	2.82	±0.53	2.99	±0.51	0.000**
What is well-dying	3.40	±0.60	3.40	±0.57	1.000	3.34	±0.66	3.45	±0.56	0.061
Definition of death	2.79	±0.61	2.80	±0.65	0.831	2.81	±0.84	2.73	±0.61	0.288
Process of death	2.42	±0.82	2.52	±0.76	0.130	2.45	±0.80	2.41	±0.76	0.585
Fear of death	3.05	±0.61	3.26	±0.59	0.000**	3.02	±0.65	3.16	±0.67	0.020*
Influence of death	3.32	±0.49	3.39	±0.51	0.154	3.29	±0.53	3.37	±0.54	0.138
Funeral culture	2.50	±0.84	2.33	±0.90	0.021*	2.43	±0.87	2.31	±0.95	0.178
Tribute culture	2.34	±0.80	2.23	±0.91	0.144	2.31	±0.88	2.13	±0.92	0.027*
Comparison of funeral and tribute culture of Korea and the world	2.34	±0.81	2.28	±0.78	0.366	2.27	±0.84	2.25	±0.85	0.747
Medical ethical review	3.05	±0.76	3.15	±0.76	0.103	3.06	±0.81	3.14	±0.79	0.238
Cases of medical ethical issues	3.35	±0.64	3.40	±0.62	0.370	3.33	±0.67	3.35	±0.67	0.704
Medical staff communication	3.32	±0.49	3.31	±0.55	0.901	3.34	±0.54	3.32	±0.59	0.697
Family communication	3.20	±0.53	3.23	±0.42	0.398	3.24	±0.51	3.23	±0.42	0.874
Communication of the person himself/herself	3.13	±0.65	3.25	±0.61	0.030*	3.28	±0.66	3.18	±0.56	0.094
Terminally ill patient's right to know and medical decision	3.38	±0.62	3.43	±0.55	0.386	3.39	±0.58	3.46	±0.54	0.208
Forgiveness and reconciliation	3.20	±0.59	3.23	±0.55	0.618	3.17	±0.60	3.21	±0.63	0.537
Death and law	3.30	±0.74	3.33	±0.56	0.551	3.24	±0.55	3.29	±0.55	0.334
Funeral arrangements	3.05	±0.74	3.27	±0.73	0.002*	2.99	±0.73	3.19	±0.76	0.005*
Overview of hospice	3.04	±0.62	3.07	±0.59	0.515	3.03	±0.60	2.99	±0.60	0.429
Reality of hospice palliative care	3.19	±0.59	3.22	±0.54	0.488	3.20	±0.58	3.18	±0.52	0.711
Loss and healing theory	3.12	±0.60	3.08	±0.55	0.426	3.14	±0.59	3.05	±0.59	0.079
Death and acceptance	3.14	±0.67	2.97	±0.72	0.013*	2.93	±0.82	3.10	±0.76	0.027*
Psychological healing - writing healing	2.76	±0.78	2.91	±0.74	0.052	2.83	±0.85	2.89	±0.76	0.442
Psychological healing - meditation music	2.72	±0.64	2.85	±0.66	0.032*	2.78	±0.75	2.77	±0.70	0.875
Psychological healing-art therapy	2.75	±0.74	2.74	±0.76	0.979	2.76	±0.74	2.65	±0.78	0.102
Psychological healing-forest therapy	2.80	±1.04	2.75	±0.75	0.518	2.80	±0.74	2.64	±0.79	0.046*
Psychological healing -drama therapy	2.74	±0.73	2.81	±0.66	0.246	2.78	±0.72	2.64	±0.75	0.049*
Psychological healing-healing using plants and pets	2.95	±0.72	2.91	±0.67	0.434	2.97	±0.74	2.84	±0.76	0.078
Overview of near death experience	2.84	±0.79	2.91	±0.71	0.301	2.89	±0.79	2.87	±0.76	0.820
Near death experience-medical opinion	2.87	±0.75	3.04	±0.62	0.007*	2.89	±0.78	2.96	±0.68	0.324
Near death experience-philosophical, religious opinion	2.39	±0.72	2.39	±0.77	0.843	2.28	±0.78	2.38	±0.78	0.136

p&lt;0.05, \*\*p&lt;0.001

#### IV. CONCLUSION AND DISCUSSION

This study was carried out to analyze the actual effect of the courses of death education including hospice palliative care on personal attitude toward death awareness and provide basic data in the implementation of future death education. We surveyed the awareness of "to whom you should inform first that the patient is terminally ill?", "Knowing in advance that the patient is terminally ill helps to stabilize and treat the mind of patients and caregivers?", "Do you think actions of the hospital for dying patients are sufficient?", "How much

do you know about hospice palliative care?", "Who do you think mainly provides hospice palliative care?", "What do you think hospice type suitable for the reality of Korea is?" targeting college students who take 'thanatology' related lessons over two times of beginning of the semester and end of the semester and examined changes in awareness. We also asked about funeral arrangements and method to cope with a situation after death, laws relating to death, need for death preparation and compared changes before/after education of the importance and necessity of death education contents and subjects' dying knowledge.

This study was to find out if death education can actually change awareness and attitudes of students. Although most students applied for 'thanatology' lessons because of their vague interest in the theme of 'death', most students did not pay a lot of attention to the importance and necessity of knowledge of death and death education in the early semester. After taking 'thanatology' lessons for 16 weeks composed of the contents of modern society and death, what is well-dying, definition of death, funeral culture, tribute culture, medical ethical review, death communication, forgiveness and reconciliation, death and law, hospice palliative care, loss and healing, reality of psychological healing, students learned about the importance and necessity of death education and answered they had the opportunity to seriously think about the issues of death. This study results are expected to provide the basic data in professional death education at the national level in the future.

Although today humans exert enormous influence with regard to life due to the development of biotechnology and advanced medical technology, death is the most uncertain in that when and how it will come and the most certain in that anyone has the end of life. Human fear for inevitability of death and finite existence can make life biased and empty in an effort to avoid it. The proper answer to the overwhelming existential challenge of death is to personally live a life of facing and realizing the meaning of death and socially prepare for a system and environment to provide a procedure for the dignified last farewell between people who are leaving and people who let a person go. However, there are many institutional and environmental factors that make it difficult<sup>8</sup>.

'Death with dignity' law, which will be enforced in January 2018 through the grace period for 2 years after a long debate after 'Boramae Hospital' Case, derives and presents legislation of practices, civil judicialization of regulations, premise of un recoverability, respect for self-determination and introduction of procedure regulations. If this law is enforced in earnest, more and more people will finish the end of life while receiving the care of hospice palliative care rather than life-prolonging treatment which has been controversial. In order to activate hospice palliative care services, it is essential to complement institutions such as expansion of the number of hospital beds and reduction in patient burden etc. According to the trends that more and more seniors want their home or nursing facilities as the place of their death, multifaceted activation strategies will be also required such as linking with long-term care services for the elderly etc.

In order for more people to receive hospice palliative care, hospice palliative care costs should be developed within the extent that can be afforded in the current health insurance while considering the basic principles of hospice palliative care such as holistic therapy, symptom management including thorough pain management, continuous treatment, team approach. Also, the quality of hospice palliative care services should be evaluated and managed and coordination of the organizations and medical system should be closely configured.

Baby Boom generation, the living witnesses of economic modernization already faces their retirement and aging speed will be faster after 2020 when they become 65 years old. Our society has a big challenge to ensure that they can spend high quality old age and face dignified death. The solution of death problems is not a problem just confined to the elderly. All of them are the parents of the young generation who fulfilled their obligations of reproduction and social participation and younger people have a moral responsibility to prevent them facing lonely and miserable death. As shown in the results of this study, death education leads us the death issue to come in the aged society to find a solution to solve more wisely by learning about a variety of topics related to death. Apart from the real problem that more than 1/4 of the total medical expenses are used at the time ahead of death, all ages need to learn and review what is death without losing dignity as a human being. 'Dignified death' will be left as a meaning for completed life as a beautiful finish for those leaving and for the question 'how should we live' for those left.

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## Who is Afraid of Power and Horror?: Emotional Narrative Through Story Mining in *Apocalypse Now*

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### Abstract---

**Background/Objectives:** This paper has the aim to analyze viewer's emotion concerning power and horror in the film of *Apocalypse Now*. The Emotion concerning Vietnam War is driven by the sound and darkness.

**Methods/Statistical analysis:** This paper will explore how the different narrative structures influence our perception in this film as the disclosure of 'emotional darkness' hidden in human mind of rapaciously insanity. Text mining techniques will visualize how the diverse images and sounds and the film script documents of *Apocalypse Now* influence on viewer's perception of 'Human Darkness' hidden under the circumstances of Vietnam War.

**Findings:** The emotional structure of human darkness in *Apocalypse Now* is framed as 'Kurtz-Willard-audiences.' Willard executes Kurtz following the orders of the U. S. Headquarters, then, rejecting to be the new leader of Kurtz's kingdom, he "leaves" for "nowhere," with the resounding cognition of the reality of human darkness. The fact that in this film there are only the audiences who would listen to Willard's interpretation of Kurtz's last word, 'horror, horror' does not make film viewers insane in the real space, but make insane in a fantastic space.

**Improvements/Applications:** This paper will analyze the emotional darkness between the impact of sound and the power of light and shade through the text mining revealing 'horror' only in the fantastic spectacle space, which will be proven as the story mining in the process of audience cognition.

**Keywords---** *Apocalypse Now*, Horror, Emotional Darkness, Story Mining, Light and Shadow, Sound.

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## I. INTRODUCTION

The film images and sounds have blurred our competence to differentiate between reality and simulation, making our experience of war into a mere "spectacle." Movie technology and image spectacles resulted in a positive depiction of war, and our cognition of that spectacle turns us as viewers into implicit imperial subject. Vietnam War exists in his film, *Apocalypse Now*<sup>1</sup>, however, Coppola explained that the Vietnam experience he attempted to depict was, in fact, an emotional darkness through the hyper-reality. Coppola noted that the production itself mirrored psychological reality in many ways. "It was crazy," he said. "And the way we made it was very much like the Americans [who] were in Vietnam. We were in the jungle, there were all of us, we had access to too much movie equipment, and little by little, we went insane"<sup>2</sup>. Coppola's powerful visual images and multi-layered sound track, still have behind them the "terrific suggestiveness" of Conrad's illuminations<sup>3</sup>, *Heart of Darkness*. This paper investigates how Coppola's intention for the human darkness has transmitted to the viewer's emotion by emphasizing on the impact of sound and the power of light and shade due to the human darkness on behalf of the power in the war; instead, we can find the ironical spectacle on "horror" biased by the American Imperialism.

## II. LITERATURE REVIEW

Ebert explained Coppola's film to his list of "The Great Movies", stating: "*Apocalypse Now* is the best Vietnam film, one of the greatest of all films, because it pushes beyond the others, into the dark places of the human soul. It is not about war so much as about how war reveals truths we would be horrible never to discover"<sup>4</sup>. However, many critics have debated whether *Apocalypse Now* is an anti-war or pro-war film. Some critics insist that the anti-war message reveals the non-intentional brutality of the war, the absence of military ordering system, and the imagery of machinery destroying human and nature. Advocates of the film's pro-war stance, however, point the same elements as a glorification of war and the declaration of American supremacy. According to Tomasulo, "the U.S. foisting its culture on Vietnam," including the destruction of a village so that soldiers could enjoy surfing, proves the film's pro-war message. Not to mention of pro-war or anti-war film, however, this paper will explore the provocative issues on what is the emotional reality of human darkness in this film concerning the Vietnam war<sup>5</sup>.

This study uses text mining techniques to analyze the script documents. Text mining is a techniques inducing information from diverse form of texts such as news, web contents, product reviews, and social networks. It, in detail, finds patterns, trends, relations, and meaningful information from those texts. The processes of text mining generally involve crawling the text, parsing the text, analyzing the text, and representing the output in visual forms. In many cases, natural language processing techniques, lexical analysis of word frequency are used alone with data text mining techniques such as association rule analysis and visualization techniques<sup>6,7,8,9,10</sup>.

Text mining has been applied to diverse areas such as product reviews analysis, stock market predictions, opinion mining on products, and sentiment analysis for movies. As one of the text mining areas, social mining uses social text from Facebook, Twitter, and Blogs. Analysis of these texts provides what are the customer's opinion on the products and services. It also helps companies understand customer's needs and wants<sup>11,12,13,14</sup>. In this paper, however, *Apocalypse Now* film scripts are analyzed to find frequently used words as important key words, which contribute the major story architectures in general. These story architectures are also associated by rule analysis to find relationship and pattern among these key words. This paper will track down through *Apocalypse Now* the fact that frequency of those key words and relationships among them would provide major components building the stories in the scripts as most stories consist of meaningful key words and relationships among these keywords.

This story mining is not a new concept, but it requires a new approach. To effectively communicate about the text mining, this story mining is not telling about others, but telling about your story. It's about connecting some narrative with sounds and lights in ways in which there are relevant to the audience, which is focusing on the *why*, rather than the *what* and the *how*. The story mining is the best practices through the lens of narrative structure and expert storyteller, how to make a story more meaningful connections with their audience and how to enlighten to reach and to maximize the impact of their stories.

### III. PROPOSED WORK

As a film study of the Vietnam War, *Apocalypse Now* will show how even Hollywood films can claim for the emotional darkness to those who just declare an emphasis on filmic technology and the image spectacles concerning war. Despite claiming to be against a war, this film is depicting America's psychological involvement in Vietnam War, which seems at best ambivalent about war, while at worst, it also seems to celebrate it. The very nature of cinema indeed has the tendency to make war into spectacles in which the images with lights and shadows and sounds are embedded. Therefore, the viewers' reception of those spectacles turns into a simulation with indirect providers of the imperial project. By accepting images of war as a form of illusionary spectacles with grandiose sounds and overwhelming lights, the viewer thus becomes both colonizer and colonized. As J. Beller suggests in "The Cinematic Mode of Production," we become a colonizer through the camera's angle, which is simultaneously that of imperial subject, and because we create the scene by patching together with separate frames<sup>15</sup>. We are also colonized, however, because this film has conquered our mindful nature and Vietnam landscape, turning us through participation into subjects both of Hollywood and of American imperialism, as our free mind is surrendered to the money-making entertainment industry.

In order to prove these, this paper will explain the viewers' emotional data statistically on horror driven by the power of war in which Colonel Kurtz has been secluded and embodied. This paper will prove Willard's vantage point of view can be transmitting to the viewers through the storytelling architecture in *Apocalypse Now*. In the last scene, the words of 'horror, horror' echoes resoundingly from Kurtz via Willard into the viewers in the blending space of fantasy in the product of conceptual metaphor and emotional sympathy.

The conceptual metaphor of power and horror is shading with the film elements of lights and sound, so all the viewers' concept of anti-war and horrible brutality driven by the human darkness in the war are intervened by the emotional complex with lights and sound. This paper investigates viewers' emotional responses on the power and horror exerted by aesthetically dominant lights and grandiose sound in *Apocalypse Now*. The impact of sound and the power of lights and shadows result in the emotion of human mind. Plutchik's Wheel of Emotions has been authoritative for the model of emotions since 1980s. It has eight primary bipolar emotions that are analogous to color wheel, by extending or combining the different emotions up to 32 kinds of emotions of human beings. According to the followings, the emotion of 'horror' in the film of *Apocalypse Now* has deeply related with the dark color feelings such as fear, terror, anger, disgust, anxiety, stress, awe, despair, sadness, shame, irritation, submission, and so forth.

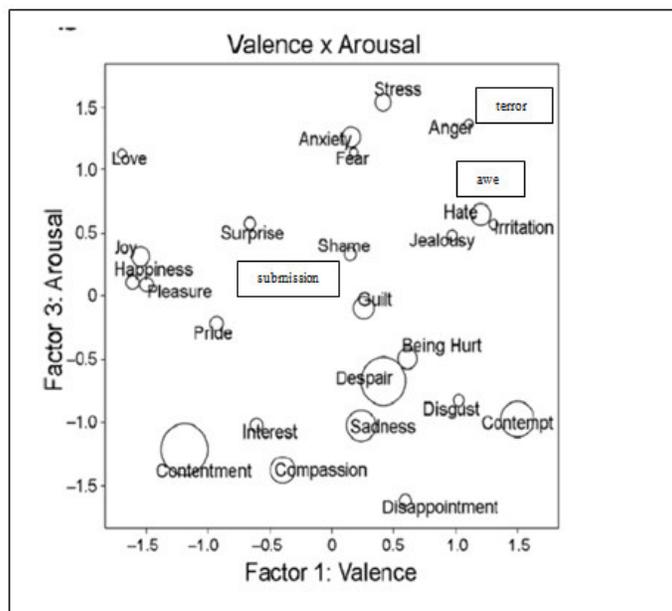


Figure 1: The Relativity of Emotion for 'Horror'

In *Apocalypse Now*, film narrates a privileged vantage point from Willard and via the camera eye for the viewers as well. As Willard heads out with the guard boat to take him upriver, we, as the viewers, gaze on the rugged Vietnamese landscape from the helicopter flying high over the jungle. This "commanding view" offers a "sense of mastery over the unknown"<sup>16</sup>. At the same time, the vastness of the Vietnamese landscape gives us a sense of its empty darkness, suggesting that it is a nature that needs to be civilized with lights. The destruction of the U.S. military wreckers is thus representative of the American conquering toward the Vietnamese darkness and its myth-making from the white man's supreme image. This film shows itself replicates the conquest of the nature through its "military ordering" mastery over the Vietnamese landscape. The Vietnamese are also gazed on, and "conquered" with the emotions such as fear, terror, anger, disgust, anxiety, stress, awe, despair, sadness, shame, irritation, submission, and so forth. When Willard finds the commanding officer, Colonel Kilgore, he leaps to terrorize all the Vietnamese, in the background a landing craft, paralleled with the head of a shark to "swallow" a Vietnamese hut, smashing survived Vietnamese villagers with 'horror'.

Kilgore uses loudspeakers at top volume to play Wagner's "Ride of the Valkyries," as he swoops down on a dark Vietnamese school yard with American lights of gun fires. His full of fire lights toward the dark Vietnamese emptiness turns into frightening with his emptiness with dark emotion such as fear and horror. This paper also explains Willard's cognition process is ended up with the emotion of 'horror', just as Colonel Kurtz has kept with it as a symbol of darkness itself. Willard intends to enlighten Kurtz's darkness, however, Willard turns into stuck with emotional darkness as horror as Kurtz realizes at the end of his life. The following Figure 2 will prove that the gun fire lights that Willard keeps to search down Kurtz convey reversed into the dark 'horror' of the Mekong River in which Willard is finally stuck at the moment when Kurtz has exclaimed as his last words.

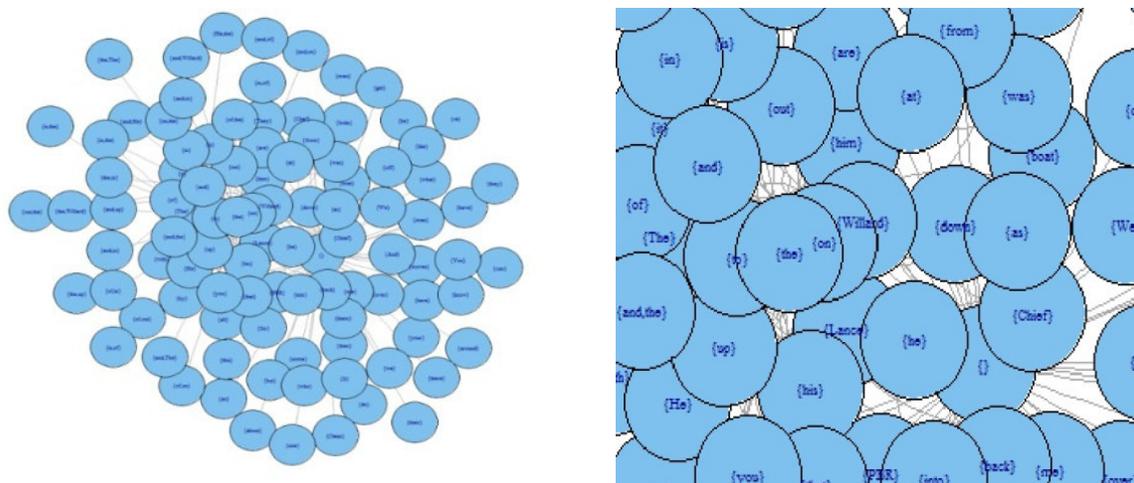


Figure 2: Analysis and Explanation for the Key Words and Relationships

Text mining of *Apocalypse Now* is visualizing with the key word of "Willard" at the center of network. It is scientific and natural, because this film is thoroughly narrated by Willard, so that the perceptions of the stories on Kurtz are conducted by Willard. Willard is seeking the distorted power of Kurtz into the deep 'down' of the Mekong river, with the basic clue of PBR, a record of voice of Kurtz, who is rarely seen his name in this network. Willard is only seeking 'down' to the shadow of Kurtz. Across the Cambodia, Willard's emotional darkness is deep downing into the hearts of Kurtz identity. Figure 2 shows several important words such as 'Willard', 'down', 'PBR', 'boat' and 'He' around the center of the network. In this Figure 2, on the left centered, 'He' is indexing Kurtz without referring his real name. Kurtz has no name, because nobody knows about Him who is endowed the only symbol of Human Darkness due to the betrayal of the US army. Kurtz is the only shadow without lights in the two third part of this film story.

When Willard is heard of Kurtz from US Headquarters, he could not realize how the name of Kurtz would be in the center of his heart, however, in the process of Kurtz's seeking into deep down of the Mekong River, Willard could hear only the rumors about Kurtz surrounded by the darkness of camera eyes with lights and shades. Only with the resounding sound effect of heart beating and silence sometimes, the film spectacle has

the foregrounds of darkness with shading lights to search down the heart of Willard's emotion. After experiencing several reality of American military troop actions toward the Vietnamese and their landscapes, Willard is going forward to the darkness of his search with camera shadowed lights. The audience's intention and panic psychology is extreme when Willard is brought in front of Kurtz only in the darkness, while Willard is just heard from Kurtz talking voice in the shadows. Kurtz finally revealed his forehead partially, and half of his face with camera lights and shadows after Willard confessed his identity for the search Kurtz under the command from US Headquarters. The camera eye with lights represents the symbolic implication of how much Kurtz can be understood by Willard's heart and psychology in the jungle of Vietnam as an Absolute King, which is apart from the information of US military headquarter. Willard and his audience are only feeling detention in the caught of Kurtz voice without the cognition of his whole identity and without the revelation of his feature from the camera eyes in the shadows. This is the filmic technology and psychological approach of how to understand and interpret the real identity concerning Kurtz and his Kingdom in Vietnam.

The below Table 1 clearly shows that what kind of negative words are frequently appeared in the film: ① 'I' (Willard) : 472 ; ② 'He'(Kurtz) : 247 ; ③ 'Willard' : 216 ; ④ 'down' : 113 ; ⑤ 'boat' : 91 ; ⑥ 'look' : 76 ; ⑦ 'move' : 58 ; ⑧ 'what' : 55 ; ⑨ 'river' : 45 ; ⑩ 'want' : 42 ; ⑪ 'fucking' : 41 ; ⑫ 'water' : 36 ; ⑬ 'Vietnamese' : 34 ; ⑭ 'black' : 22 ; ⑮ 'bridge' : 21. There are only two or three positive words that are appealing such as 'know' : 63 ; 'American' : 18.

Table 1: Word Frequency in *Apocalypse Now*

	A	B	C	D	E	F	G	H	I	J
1	the	to	and	a	of	I	s	you	in	is
2	1441	592	586	531	472	442	336	326	325	294
3	The	it	He	on	Willard	that	up	out	t	his
4	276	275	247	233	216	211	201	182	174	167
5	with	at	he	are	him	was	for	Lance	You	as
6	165	160	155	152	151	147	125	120	120	113
7	down	from	They	into	all	Chef	there	this	they	back
8	113	111	110	109	107	107	107	107	106	103
9	We	man	It	them	boat	Chief	me	we	can	one
10	102	101	99	99	91	91	85	85	84	80
11	by	get	looks	here	Clean	m	over	re	their	off
12	79	77	76	75	74	74	73	73	71	70
13	have	Captain	do	know	PBR	be	like	what	right	an
14	69	65	63	63	62	61	61	60	59	58
15	moves	around	your	A	And	my	What	Kurtz	some	then
16	58	57	57	56	55	55	55	54	54	54
17	her	who	about	go	There	through	turns	got	just	but
18	53	53	50	50	49	49	49	47	47	46
19	has	men	That	river	see	ll	She	away	don	gonna
20	46	46	46	45	44	43	43	42	42	42
21	not	want	fucking	going	water	really	two	were Vietnamese	been	
22	42	42	41	40	36	35	35	35	34	33
23	But	Kilgore	sir	helicopter	No	other	think	SEE	come	had
24	33	33	33	32	32	32	32	31	30	29
25	jungle	no	soldier	French	Hey	took	soldiers	toward	ve	way
26	29	29	29	28	28	28	28	28	28	28
27	All	front	looking	us	where	Yeah	now	or	starts	take
28	27	27	27	27	27	27	26	26	26	26
29	time	people	something	would	Come	dead	Get	hands	if	Let
30	26	25	25	25	24	24	24	24	24	24
31	never	shit	This	when	colonel	continues	fire	How	next	so
32	24	24	24	24	23	23	23	23	23	23
33	war	As	black	crew	good	hand	himself	more	move	too
34	23	22	22	22	22	22	22	22	22	22
35	behind	bridge	d	forward	head	make	sitting	smoke	table	walks
36	21	21	21	21	21	21	21	21	21	21
37	army	could	didn't	said	say	still	trying	Vietnam	dock	little
38	20	20	20	20	20	20	20	20	19	19
39	natives	place	she	takes	very	will	American	being	board	Don
40	19	19	19	19	19	19	18	18	18	18

There is the following text mining below: Figure 3 is the analysis from Willard's narratives, in which Willard is still conscious of himself, while the small letter of Kurtz is just a symbolic pair, who is paralleled with Willard's own identity of emotional darkness. Figure 4 is the analysis of Kurtz's narratives, which shows, to the contrary, that Willard is still centered from the perspectives of Kurtz. It is because that Kurtz attempts to tell Willard his own true story about the American military troop and American national identity in Vietnam War, which revenue is going toward the human darkness itself.



trauma of Vietnam War, where he just knows that make-believing is the only way of his survival from the US army. Indeed, the true 'horror' that he faces in the last scene might be in cognizing that he can no longer function outside his role as a soldier, and the life he once knew back in the US world is where he can never return<sup>17,18,19</sup>.

While the movie gives you an emotional extension of the American imperial and colonial subject, *Apocalypse Now* not only expresses an anti-war stance of imperialism, but also reveals the emotional darkness through cinematography with lights and sounds. Through Willard's vantage narration, and his emotion embedded storytelling structure, the real failure of this film may be its failure to recognize what the 'horror' means, why it is 'horror', and to whom the 'horror' is referring in the lineage structure of Kurtz-Willard-audience. The distinction between lights and shadows and the resounding sounds cause us war experience of make-believing of Hollywood myth-making machine. This mythology can control us with the illusion of 'horror' with emotional darkness, and we, as viewers, are complicit in its production and reproduction.

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**WITHDRAWN**

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## The Effects of Smartphone Addiction on Self-Esteem and Empathy among Nursing Students

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### Abstract---

This study is conducted to examine the relationships among self-esteem empathy of nursing students by identifying the extent of smart phone addiction affecting the mental health of them. From March 12 to 24, 2016, three hundred and twenty-nine nursing students were selected from 3 university in C city, and all of them filled out a questionnaire for data collection of this study. Within subjects, there appeared to be negative correlations between the smart phone addiction and self-esteem ( $r=-.127$ ,  $p=<.01$ ) and showed pure correlations between the self-esteem and empathy ( $r=.125$ ,  $p=<.05$ ) of the group, respectively. The subordinate factors affecting the self-esteem and empathy of nursing students related to smartphone addiction, were confirmed by using multiple regression analysis. The factors affecting the self-esteem was the loss of control ( $\beta=-.225$ ,  $p=<.001$ ), the explanatory power was 51%, whereas those affecting the empathy was the daily life disability ( $\beta=-.163$ ,  $p=<.05$ ), the explanatory power was 18.0%.

Thus nursing students are expected and be able to act as a health care giver after graduation by promoting self-esteem and empathy learned from the university education, thus it is required to develop curriculum and operate prevention and treatment program for smart phone addiction including the self control of smart phone use.

**Keywords---** Nursing Student, Empathy, Self-Esteem, Smartphone Addiction.

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## **I. INTRODUCTION**

### **A. Purpose**

Smartphone enables real time internet usage, and with multi functioning smartphones being released, distribution rate thus use of smartphone are continually increasing. In previous studies, it showed that factors other than mental and personality factors, for example function of smartphone or media characteristic factors are affecting smartphone addiction. According to James and Drennan(2005)[1], people who shows addicted usage of smartphone regard smart phone as themselves, have a tendency to think smartphone as entertaining, voluptuous means, thus media characteristic factor affected hugely on smart phone addiction. Today's smartphones can solve many daily tasks due to gradual improvement in their performance, and are spread quickly[2]. But wide spread use of smart phone brought some positive perception of self expression and expansion of communication channel, but also causes negative consequences including not only excessive charge, but also physical, mental deterioration[3]. Also 86.7% of smart phone users said their life in general became more convenient after use of smart phone, and 77.5% of the user check smart phone often without any particular reasons[3]. Therefore, due to decreased communication with people, attitude of understanding and caring for others are getting low. Recently studies on empathic ability of addiction patients are on progress, their not understanding other's mind causes hardship in interrelationship and due to stress caused from that makes them more addicted[5]. Another variables that has been treated importantly in social science else then empathy is self-esteem. Individuals vulnerable to addictive tendencies commonly shows low self-esteem, and low self-control causes another vicious cycle[6]. Thus in this study, we investigate how smartphone addiction influence on self-esteem and empathic ability through nursing student.

### **B. Focus**

1) Identify the relationships between the extent of smartphone addiction, empathy and self-esteem of nursing students. 2) Identify the subordinate factors of smartphone addiction affecting the self-esteem and empathy of nursing students.

## **II. MATERIALS AND METHODS**

### **A. Subjects**

Subjects were sampled from 3 university in C city, and all of them filled out a questionnaire for data collection of this study by convenience sampling. 400 questionnaires were distributed for the survey in consideration of dropout rates. Among them, 36 out of 365 copies were collected, and total of 329 nursing students who are literate, able to communicate and who agreed to participate in the study were selected. We collected data from March 12 to 24 in 2016.

### **B. Tools**

The questionnaire is composed of 65 items; demographics & smartphone utilization 10 items, smartphone addiction 15 items, self-esteem 10 items, empathy 30 items.

#### ***Self-Esteem***

To measure this construct, we used the self-esteem scale developed by Rosenberg in 1965[7] and later translated by Jeon[8]. The survey contained a total 10 questions on a 5-point Likert scale(1 point indicating 'not at all' and 5 points indicating 'very much so'). The higher total score, the higher the self-esteem is indicated. Negatively asked questions were calculated in reverse order.

#### ***Empathy***

To measure the empathy, a tool of Interpersonal Reactivity Index(IRI) developed by Davis in 1980[9] and later translated by Park[10]. The survey contained a total 30 questions on a 5-point Likert scale(1 point indicating 'not at all' and 5 points indicating 'very much so'), which were distributed two subcategories; cognitive empathy, affective empathy. The higher total score was designed to mean the higher empathic ability.

#### ***Smartphone Addiction ( Smartphone Addiction Proneness Scale)***

Smartphone Addiction Proneness Scale developed by National Information Society Agency(NIA)[11] in 2011 was used. The survey contained a total 15 questions on a 5-point Likert scale(1 point indicating 'not at

all' and 5 points indicating 'very much so'), which were distributed four subcategories; daily life disability, withdrawal, tolerance, loss of control. The higher total score was designed to mean the higher smartphone addiction.

**C. Data Analysis**

Statistical analysis was performed using the SPSS Win 20.0 program with a significance level set at p<0.05. The extents of self-esteem, empathy and smartphone addiction were analyzed using descriptive statistics. The relationships between the self-esteem, empathy and smartphone addiction of nursing students were identified by using the Pearson's correlation coefficient. Stepwise multiple regression was performed to clarify influential power of the self-esteem and empathy in the smartphone addiction of them.

**III. RESULTS**

**A. General Characteristics of Female College Students**

Table 1 reports the general characteristics of female college students. Age groups had the highest percentage of in 10-20s(98.5%).

The mobile device types was smartphone (99.1%), use duration was less than 2year( 79%). The use time showed more than 3hour per day(64.1%). The monthly use rate was 4-80.000(72.4%), Phone fare has increased compare to the previous(73.9%).phone use motivation was broad communication with around people(49.8%), main use function was SNS(53.8%).

Their use satisfaction showed very good(3010%) and good(53.8%),category of satisfaction appear to be attaining and utilizing information from web searching(50.2%).

Table 1: Demographic Characteristics of Study Participants

(N=329)

Characteristic	Categories	N(%)
Age(year)	Teenager	158(46.5)
	Twenty	171(52.0)
	Thirty	5(1.5)
Mobile device types	General phone	1(0.3)
	Smartphone	326(99.1)
	Tablet pc, i-pad	2(0.6)
Use duration	<1year	121(36.8)
	<1-2 year	139(42.2)
	≥3year	69(21.0)
Use time(day)	<1 hour	5(1.5)
	<1-2hour	35(10.6)
	<2-3hour	78(23.7)
	≥3hour	211(64.1)
Monthly use rate	20.000won	1(0.3)
	2-40.000won	48(14.2)
	4-60.000won	116(34.4)
	6-80.000won	126(37.4)
	≥100.000won	46(13.6)
Phone fare comparison	Decreased	10(3.0)
	No change	76(23.1)
	Increased	243(73.9)
Phone use motivation	Latest trends	47(14.3)
	Various news search	97(29.5)
	Business and academic help	21(6.4)
	Broad communication with around people	164(49.8)
Main use function	Voice call	12(3.6)
	Text message	14(4.3)
	Internet search	72(21.9)
	Enjoy the music/movies, and watch DMB	44(13.4)
	Games and hobby game entertainment features	10(3.0)
	SNS(KakaoTalk etc.)	177(53.8)
Use satisfaction	Very good	99(30.1)
	Good	177(53.8)
	So so	51(15.5)
	Dissatisfaction	2(0.6)
Category of satisfaction	Attaining/Utilizing informations from Web Search	165(50.2)
	SNS(KakaoTalk, twitter etc.)	85(25.8)
	Playing Games, Relieve stress	26(7.9)

### B. Extents of Self-Esteem, Empathy, and Smartphone Addiction

Table 2 reports mean scores, standard deviation, and range of variables in nursing students. Participants' mean scores for self-esteem, empathy in the smartphone addiction were 34.37(SD=5.78), 105.83(SD=12.95), 43.31(SD=11.14) respectively. Mean score of self-esteem, empathy, smartphone addiction were over the moderate level.

Nursing students showed 3.44±0.58 points (range, 1–5) in self-esteem; 3.53±0.19 points (range, 1–5) in empathy; 2.89±0.74 points (mean±SD; range, 1–5 points) in the smartphone addiction.

Table 2: Mean Scores of Smartphone Addiction, Self-Esteem, Mental Health

(N=329)			
Variable	MD±SD	Min	Max
<b>Self-esteem</b>	34.37±5.78	16	50
<b>Empathy</b>	105.83±12.95	54	146
Cognitive empathy	51.16±6.85	27	72
Affective empathy	54.67±7.68	27	74
<b>Smartphone addiction</b>	42.82±11.08	15	75
Daily life disability	14.17±3.87	5	25
Withdrawal	11.57±3.62	4	20
Tolerance	12.28±3.27	4	20
Loss of control	4.81±1.84	2	10

### C. Relationships Between the Self-Esteem, Empathy, and Smartphone Addiction of Nursing Students

Table 3 reports relationships between the self-esteem, empathy and smartphone addiction of nursing students. Self-esteem showed positive correlation with empathy( $r=.125$ ,  $p=∠.05$ ), but negative correlation with smartphone addiction( $r=-.127$ ,  $p=∠.05$ ). It suggests that higher self-esteem also mean good empathic skills and lower self-esteem is related to high level of smartphones addiction.

Table 3: Correlation Coefficients of key variables

(N=329)									
Variables	Self-esteem	Cognitive empathy	Affective empathy	Empathy	Daily life disability	Withdrawal	Tolerance	Loss of control	Smartphone addiction
<b>Self-esteem</b>	1	.181**	.049	.125*	-.154**	-.039	-.090	-.225**	-.127*
Cognitive empathy	.181**	1	.568**	.877**	-.006	.068	.046	-.067	.018
Affective empathy	.049	.586**	1	.903**	-.039	.043	.024	-.090	-.010
<b>Empathy</b>	.125*	.877**	.903**	1	-.026	.062	.039	.089	.004
Daily life disability	-.154**	-.006	-.039	-.026	1	.730**	.763**	.707**	.908**
Withdrawal	-.039	-.0681	.043	.062	.730**	1	.772**	.481**	.905**
Tolerance	-.090	.046	.024	.039	.763**	.772**	1	.497**	.912**
Loss of control	-.225**	-.067	-.090	-.089	.707**	.481**	.497**	1	.655**
<b>Smartphone addiction</b>	-.127*	.018	-.010	.004	.908**1	.905**	.912**	.655**	1

\*\* $p<.01$ . \* $p<.05$

### D. Self-Esteem Affecting the Subordinate Factors of Smartphone Addiction in Nursing Students

Factors affecting the self-esteem of nursing students related to the smartphone addiction.

Table 4 reports a multiple regression analysis of the relationship of self-esteem and smartphone addiction.

The multiple regression analysis showed that the self-esteem has 16% of explanation power to the smartphone addiction( $\beta=-.127$ ,  $p=∠.05$ ). Examining self-esteem's effects on smartphone addiction in details, self-esteem that significantly contributed to subordinate factors of smartphone addiction were loss of control( $\beta=-.225$ ,  $p=∠.001$ ), explanation power shown to be 51%. Followed by the factors affecting the self-esteem was the of daily life disability ( $\beta=-.154$ ,  $p=∠.01$ ), explanation power shown to be 24%.

Table 4: Summary of Multiple Regression Analysis Between Self-Esteem and Smartphone Addiction

(N=329)

Selected Variables	B	$\beta$	R <sup>2</sup>	Adj. R <sup>2</sup>	F
<b>smartphone addiction</b>	-.244	-.127*	.016	.013	5.319
Daily life disability	-.103	-.154**	.024	.021	7.973
Withdrawal	-.024	-.039	.001	-.002	.488
Tolerance	-.051	-.090	.008	.005	2.685
Loss of control	-.072	-.225***	.051	.048	17.425

B=unstandardized coefficients;  $\beta$ =standardized coefficients. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

**E. Empathy Affecting the Subordinate Factors of Smartphone Addiction in Nursing Students**

Factors affecting the empathy of nursing students related to the smartphone addiction.

Table 5 reports a multiple regression analysis of the relationship of empathy and **smartphone addiction**.

The smartphone addiction had not the explanatory power of the empathy. But examining subordinate factor of empathy affecting sub-factors of smartphone addiction in details, the effect of empathy on nursing students related to the smartphone addiction was the loss of control( $\beta = -.161, p = .05$ ), explanation power shown to be 19%. Followed by the factors affecting the self-esteem was the of daily life disability( $\beta = -.163, p = .05$ ), explanation power shown to be 18%.

Table 5: Summary of Multiple Regression Analysis Between Empathy and Smartphone Addiction

(N=329)

Selected Variables	B	$\beta$	R <sup>2</sup>	Adj. R <sup>2</sup>	F
<b>smartphone addiction</b>	.003	.004	.000	-.003	.004
Daily life disability	-.528	-.163*	.018	.009	2.033
Withdrawal	.275	.099	.009	.009	2.033
Tolerance	.177	.059	.008	.009	2.033
Loss of control	-.275	-.161*	.019	.010	2.069

B=unstandardized coefficients;  $\beta$ =standardized coefficients. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

**IV. DISCUSSION**

Nursing students require self-esteem and emphatic ability as a future health profession who have to look after human health[12]. But nursing students compared to other students in major invest more time on their study due to practical training within set period, experience excess academic stress compare to their ability, have elevated stress level, shows pathological mental state including anxiety, depression, hopelessness[13].

In the relationships between the relevant factors of nursing student's smartphone addiction are higher, as well self-esteem was lower, and also, smartphone addiction are higher, empathy was lower. This was similar to the findings of researchers who claimed smartphone addiction provoked a various physiologic, psychologic, behavioral health problems to persons [2],[3],[12]. And also, higher the addictive trait of smartphone showed higher anxiety, and depression level, and reported problem in interpersonal relationship [2],[3],[12],[13]. Park[10] claimed self-control is preventive factor which can prevent smartphone addiction, and Kim[5] claimed higher the smartphone addiction shows more egocentric problem, needing to focus on forming interpersonal relationship in real world, which shows similar results to this study showing daily life disability, a sub factors of smartphone addiction affecting self-esteem and emphatic ability of nursing students.

**V. CONCLUSION**

In the current study, authors confirm the extents of the smartphone addiction affecting the self-esteem and empathy, and their relationships. Based on these results, authors suggest that the effective strategies to reduce smartphone addiction and adaptable care programs promoting the self-esteem and empathy of nursing students could be developed.

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## Dual Income Polarization by Age Groups in Korea: 1990–2014

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### Abstract---

**Background/Objectives:** This study aims to find the income polarization trends by dividing households into five age groups, using the 'Household Survey' data for 1990-2014, and see if there exists a dual pattern in the income polarization by age groups of 20's and 60's.

**Methods/Statistical analysis:** We use an IQSR, dividing the fifth quintile by the first quintile to measure the income polarization. Also we try to figure out the determinants of income disparities in Korea during the 1990–2014 period using regression analysis by using two estimation methods-the fixed effect model, and the random effect model. The Hausman test shows the random effect model turns out to be the optimal model.

**Findings:** We found that the income disparity has widened during the 1990–2014 period for all age groups in Korea. The major reason for the worsened income disparity comes from so-called a dual income polarization within two age groups, i.e., people in their 20s and people in their 60s.

**Improvements/Applications:** Our empirical results imply that there exists the double income polarization within two age groups of people in 20s and people in 60s. It says that it should be required to implement policies or programs for those age groups.

**Keywords---** Income Polarization, Age Groups, Income Quintile Share Ratio, Inequality, Polarization Index.

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## I. INTRODUCTION

Recently income polarization has been a very important and solvable issue. Especially, it has been more interested than before after Piketty's new book, "Capital in the Twenty-First Century", published in 2014, where he focused on the income share of the top 1-percent class to total population.

There are a few definitions for it. A polarization concept is related but distinct from an inequality concept, and then tries to capture the distance or the degree of separation between individuals or households in a distribution. Another definition is that incomes move towards the extremes and thus there are fewer in the middle. Also starting with Foster and Wolfson <sup>1</sup>, Esteban and Ray <sup>2</sup>, and Wolfson <sup>3</sup> have contributed to a number of different polarization measures. After that, the income polarization has been an academic and measurable issue to being discussed and thus considered. And now most related works deal with it using an index like the Esteban-Ray Index or the Wolfson Index, and sometimes the deciles distribution ratio using the Income Quintile Share Ratio (hereafter, IQSR). It is known that IQSR used for an income polarization index are not based on the theory, differently from Esteban-Ray index or Wolfson index. Those indexes found in related works say that the polarization of income has been increased and enlarged year annually. There seems to be no exception in Korea, which can be found from Choi<sup>4</sup>, Min et al. <sup>5</sup>, Shin and Jeon <sup>6</sup>, Shin and Shin<sup>7</sup>, to name a few.

Now we are interested in how different its pattern or trend are by age groups, especially young group. It supports from the Luxembourg Income Study (hereafter, LIS). LIS reports, "single young people are getting poorer compared to the average population even those with dependent children, with stagnating disposable income and onerous living costs pressing down on prosperity. In other words, singletons aged 25 to 29 in eight rich countries – the US, UK, Australia, Canada, Spain, Italy, France and Germany – have become poorer over the last 20 years compared with the average population, and unattached young adults are finding it harder than ever to set up on their own." (See the article of 8 March 2016 from <http://www.theguardian.com>). This seems to be the same as in Korea. In addition to that, we focus on the old people. The reason is that Korea is going toward the aged society the fastest in the world. It is why we focus on two age groups of people in 20s and people in 60s,

In this context, our purpose is two-fold. First, we try to find the income polarization trends by dividing the households into several age groups, using the 'Household Survey' released by 'Statistics Korea' for 1990-2014, and see if there exists a dual pattern in the income polarization by age groups of 20's and 65's. Second, we estimate which factors determines the dual pattern with summary statistics and regression equation.

Our work is composed of as follows: Section 1 introduces. Section 2 describes the literature survey, and section 3 explains the data, age groups, and income types. Section 4 discusses characteristics of the income polarization and estimation results from a regression equation. Section 5 summarizes and concludes.

## II. LITERATURE SURVEY

There are lots of studies on the income polarization around the world, for example, Foster and Wolfson <sup>1</sup>, Esteban and Ray <sup>2</sup>, and Wolfson <sup>3</sup>. However, we discuss mainly works published in Korea, such as, Choi<sup>4</sup>, Min et al. <sup>5</sup>, Shin and Jeon <sup>6</sup>, Shin and Shin<sup>7</sup>, to name a few.

Choi <sup>4</sup> claimed that the inequality index had not been consistent with the two income polarization indexes, i.e. the Esteban-Ray Index <sup>2</sup> and the Wolfson Index <sup>3</sup>. Min et al. <sup>5</sup> said that the structural causes of the deepening polarization seemed to be the following: globalization, the rise of China as a world factory, the rapid development of IT, and even institutional changes like the restructuring of big enterprises, financial institutions, and the labor market.

Shin and Jeon <sup>6</sup> asserted from characteristics of the index that the gradual increase of income polarization after the exchange crisis was due to an increase in the income disparity between the upper-income class and the lower-income class and a decrease in the disparity within the lower-income class. Shin and Shin <sup>7</sup>, using the Esteban, Gradín and Ray index<sup>8</sup>, found that polarization stemmed mainly from those who had graduated from elementary and junior high school and the elderly. Nam and Lim <sup>9</sup> found interesting results indicating that income polarization has been deteriorated during the period from 1995 to 2005, but the same kind of trend was not found in the expenditure polarization, using the Wolfson index. Cho <sup>10</sup> examined the sharp increase in the IQSR after the exchange currency crisis in 1997 and concluded it was a product of the structural change.

### III. DATA AND AGE GROUPS

#### A. Data

We make use of the “Household Income and Expenditure Survey” released by Statistics Korea (hereafter, see <http://kostat.go.kr/portal/english/surveyOutlines/4/1/index.static>) for 1990–2014. Its purpose is as follows: providing the data needed for estimating and analyzing the changes in household incomes and expenditures, providing the basic data to be used for the weighting of the Consumer Price Index and for making various economic and social policies, providing data for the production of income distribution indicators, providing basic data to be used for estimating total amounts such as the national account, and providing data to be used for calculating migration expenses, supporting the needy, and calculating the standard wages of workers for the homepage of Statistics Korea.

Until 2005, households who had two or more family members were surveyed. However, in 2006 it started to survey one-person households, whose backgrounds can be found in the census results from Statistics Korea. The census said that the number of one-person households increased from 1.64 million (12.5% of the total number of households) in 1995 to 3.3 million (20.1%) in 2007.

#### B. Age groups and Income Types

We divide the total households into the five groups by the age of a household head: under 30, 31–39, 40–49, 50–59, and over 60. In addition, we extract a focus age group, the under 30(20–29 years old) group in order to find the status quo in the labor market for the young.

We use four types of the income to measure income polarization: the labor income, the market income, the current income, and the disposable income (see Table 1). The market income adds the business income, the financial income, and the private disposable income to the labor income. The sum of the current income and the public transfer income is the current income. The disposable income is defined by deducting the income tax and the social insurance premium from the current income.

Table 1: Income Types in the Survey

Disposable income	Current Income	Market Income	Labor income	
			Business Income	
			Financial Income	
			Transfer Income	Private Transfer Income
				Public Transfer Income
			Income tax and Social Insurance premium	

### IV. CHARACTERISTICS OF INCOME POLARIZATION IN KOREA

Now we explain the empirical results of the IQSR, dividing the fifth quintile by the first quintile to measure the income polarization. Let us begin with measures based on the labor income, followed by the market income, the current income, and the disposable income. We focus on the income polarization index of the age group of 20’s. First, the IQSR indicates that the income disparity widened during the 1990–2014 period for all age groups. As we expected, economic crises, like both the exchange currency crisis in 1997 and the global financial crisis in 2008, have a serious impact on income polarization.

Second, we found a striking result, so to speak: the ratio of the IQSR for 2014 to the IQSR for 1990 is the largest for the age group of people in their 20s, as shown in Table 2. This ratio is much higher than the one for the age group of people in their 60s. This trend can also easily be seen in Figure 1. This result seems to be due to a gradual increase in the unemployment ratio of the young, which was 8.1% in 2009, 8.0% in 2010, 7.6% in 2011, 7.5% in 2012, 8.0% in 2013, and 9.0% in 2014. Therefore, the major reason for why the income disparities for the groups as a whole have worsened comes from the income polarization of the young and the old groups – double income polarization. Third, the trends of IQSR for the age group of people in their 20s and people in their 60s are more unstable than other age groups, as shown in Figure 1.

Fourth, we can see that the IQSR measures decrease as an income type is added. If we include the private transfer income to the labor income, it will be the market income. The income disparity is lessened for the market income compared with that of the labor income, as shown in Table 3.

Table 2: IQSR based on the Labor Income

Year	Age: 20s	Age: 30s	Age: 40s	Age: 50s	Age: 60s
1990(A)	4.1426	3.3747	4.4152	7.2554	34.4871
1991	3.7388	3.3560	3.8068	5.7811	11.3305
1992	3.5281	3.2144	3.8240	4.5820	19.7619
1993	3.6200	3.4828	3.9777	5.2386	29.5851
1994	3.5874	3.6472	3.6049	4.9921	44.7440
1995	3.6314	3.4794	3.5700	4.9272	35.8410
1996	3.6848	3.6353	3.8737	4.8566	27.4684
1997	3.8577	3.5247	4.0900	4.5516	40.1134
1998	5.4894	5.0526	5.4543	7.4925	33.0197
1999	5.1399	5.0114	5.4463	7.6342	29.5813
2000	4.4362	4.4186	4.6700	6.5356	32.7175
2001	4.7029	4.5416	4.9752	6.2502	26.8222
2002	4.3200	4.5152	5.3816	7.4056	51.4510
2003	4.4704	4.0576	5.3358	6.9311	22.9414
2004	5.2762	4.6004	6.2900	7.2502	19.2952
2005	5.7768	4.4099	5.4782	7.2438	24.6575
2006	6.9666	5.2437	6.3527	9.3054	78.7094
2007	6.8541	5.3942	6.0324	9.2251	75.2426
2008	10.3688	4.9895	6.8600	10.4077	79.0466
2009	18.6218	4.5681	6.6919	9.7815	48.2986
2010	8.6111	5.8847	6.8983	8.7841	51.4432
2011	21.2095	5.3558	5.8263	9.0949	52.5997
2012	7.5529	4.5197	6.2103	8.4928	87.9585
2013	5.3944	4.2449	5.5150	8.2564	56.8105
2014(B)	12.2564	4.2420	5.2167	8.5859	55.8628
B/A	2.9586	1.2570	1.1815	1.1834	1.6198

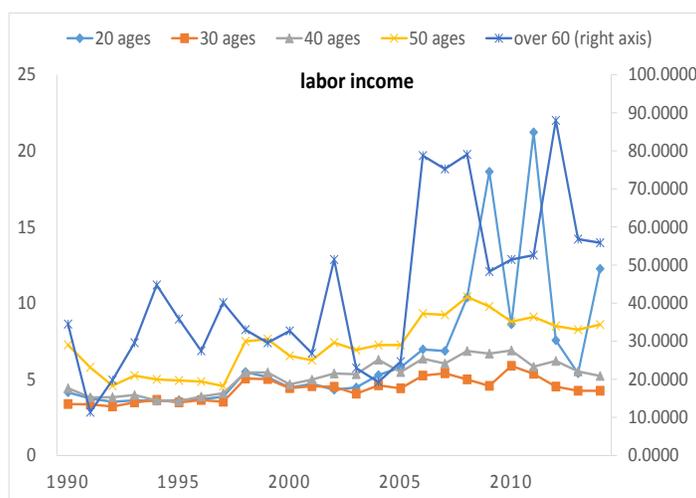


Figure 1: IQSR Trends Based on the Labor Income

In the case of current income, which is the sum of the market income and the public transfer income, and the social insurance premium, the income disparity is further lessened compared with that of the market income, as shown in Table 4. This implies that the public transfer income and the social insurance premium can lessen the income disparity and income polarization. It also implies that relatives' subsidies and the incomes transfers performed through government policy have a positive influence on income disparity and polarization. The IQSRs for market income and current income are shown in the Appendix.

Figure 2 clearly shows that the income disparity with respect to labor income is lessened by private transfer and other sources of income. Also, the income disparity with respect to market income is lessened by public transfers and other government subsidies.

Now we set the age group 'people in their 30s' as the reference group, because the IQSR was almost unchanged during the 1990–2014 period (see Table 3). The age group of people in their 20s has the highest ratio of 2014 IQSR/1990 IQSR among all groups except the age group of people in their 60s (see Table 3).

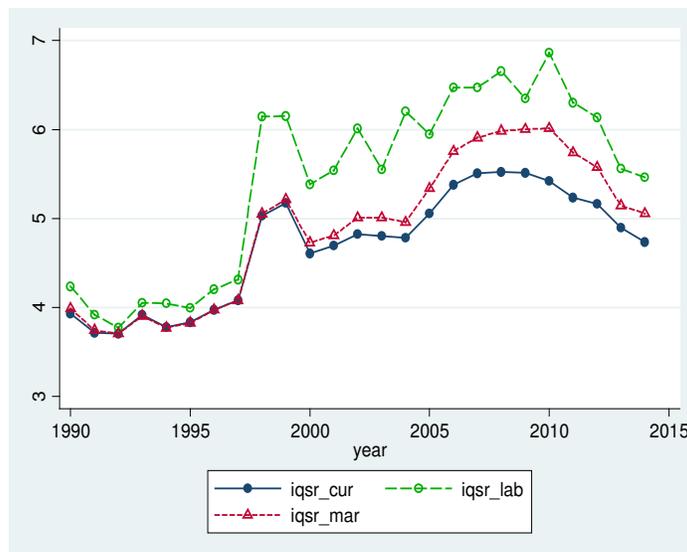


Figure 2: IQSR Trends based on the Labor Income, the Market Income, and the Current Income

Table 3: Trends of the Ratio of IQSR by Age Group to Reference Age Group(Age of 30's)

Year	Age: 20s	Age: 30s	Age: 40s	Age: 50s	Age: 60s
1990	1.1076	1.0000	1.1830	1.5291	2.3136
1991	1.0473	1.0000	1.1022	1.4411	2.0702
1992	1.0254	1.0000	1.1344	1.2224	2.7028
1993	1.0295	1.0000	1.1417	1.3388	2.6206
1994	1.0239	1.0000	1.0609	1.3283	2.4590
1995	0.9523	1.0000	1.0962	1.3312	2.7812
1996	1.0169	1.0000	1.1124	1.3151	2.6037
1997	0.9728	1.0000	1.1314	1.2621	2.7599
1998	0.9343	1.0000	1.0727	1.3297	2.2695
1999	0.8767	1.0000	1.1475	1.3298	2.2522
2000	0.8193	1.0000	1.1097	1.3342	2.1146
2001	0.9215	1.0000	1.0874	1.2264	2.0016
2002	0.8784	1.0000	1.1028	1.4342	2.0476
2003	0.9494	1.0000	1.2411	1.4764	2.5265
2004	1.0676	1.0000	1.2199	1.4126	2.3890
2005	1.0429	1.0000	1.2062	1.4150	2.3012
2006	1.2751	1.0000	1.1698	1.6086	2.8836
2007	1.0484	1.0000	1.1196	1.6292	2.9419
2008	1.0321	1.0000	1.3162	1.8279	3.1079
2009	2.0807	1.0000	1.3613	1.8785	3.3039
2010	1.1675	1.0000	1.1793	1.4721	3.2855
2011	1.9093	1.0000	1.1174	1.5829	3.6309
2012	1.3171	1.0000	1.2658	1.7536	4.1624
2013	1.0890	1.0000	1.1420	1.6580	3.7757
2014	1.7179	1.0000	1.2068	1.7408	3.5970

Note: Current Income

In Figure 3, we illustrate the income disparity by age group during the 1990–2010 period. The line of years=1990 shows the income disparities for five age groups from people in their 20s to people in their 60s. We calculated the average income disparity for five year –1990–1994 – periods for each age group to get rid of short-term fluctuations. First, it is worth noting the U-shaped curve of income disparity by age groups for all periods, as shown in Figure 3. The IQSR hits the minimum at the age group of people in their 30s, then increases up to the age group of people in their 60s. Second, the income disparity for people in their 60s has worsened as time goes by. The curvature of the U-shaped curve has become larger recently.

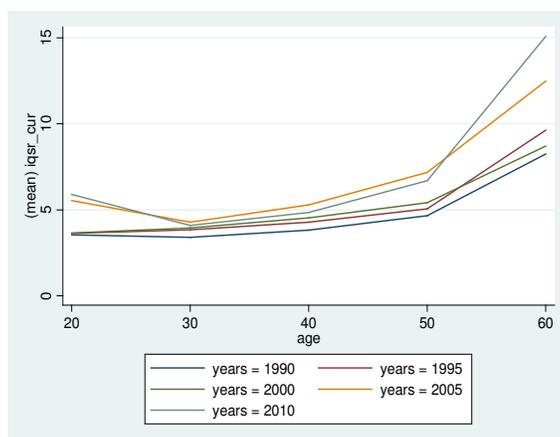


Figure 3: Income Disparity by Age Group During 1990-2014 Periods

We try to figure out the determinants of income disparities in Korea during the 1990–2014 period using regression analysis. The dependent variable is the IQSR for five age groups during the 1990–2014 periods. Thus, we will use the panel data for estimation, considering the error structure. The estimation results are shown in Table 4. We interpret the estimation results based on the random effect model, since the Hausman test statistic indicates that the random effect model is optimal. First, the income disparity has widened as time goes by since the coefficient estimate of the time trend variable is positive(0.066) and statistically significant. Second, we confirm that a dual income polarization by the 20's and the 60's contribute the overall income disparity, since the coefficients of the dummy variables for both age groups are positive and statistically significant. Furthermore, the old group contributes more than the young group to the widening of the overall income disparity.

Third, we expect that the labor market environment will also affect the income disparity. The estimation results support our expectation. The estimate of the coefficient for the variable *Regjob*, representing the ratio of households who have regular jobs in the sample, is negative(-10.877) and statistically significant. Fourth, the global financial crisis in 2008 increased the income disparity. The estimate of the coefficient for the dummy variable(*Dummy2008*) is significantly positive(1.606).

Table 4: Determinants of Income Disparity in Korea

Explanatory Variables	Dependent Variable: <i>IQSR</i> (Income Quintile Share Ratio)	
	Fixed Effect Model	Random Effect Model*
<i>Deficit</i> (Ratio of deficit households)	-13.291*** (-3.321)	-13.857*** (-3.533)
<i>Regjob</i> (Ratio of regular job)	-8.535*** (-3.748)	-10.877*** (-7.339)
<i>Dummy2008</i> (Dummy variable for 2008)	1.371** (2.424)	1.606*** (2.987)
<i>Trend</i> (Time trend)	0.083*** (3.970)	0.066*** (3.937)
<i>Dummy20</i> (Dummy variable for 20's)		0.681** (2.321)
<i>Dummy60</i> (Dummy variable for 60's)		2.870*** (4.267)
Constant	-152.334*** (-3.538)	-117.820*** (-3.432)
$R^2$	0.507	0.869
Obs.	125	125
Hausman test statistic	1.84	

Note: (1) IQSR is calculated based on current income.

(2) The t-value is in parenthesis.

(3) \*: significance level is 10%, \*\*: significance level is 5%, \*\*\*: significance level is 1%.

## V. CONCLUSION

We analyzed the trends of IQSR by age groups. The main findings are as follows. First, the IQSR indicates that the income disparity widened during the 1990–2014 period for all age groups in Korea. The major reason for the worsened income disparity came from the so-called double income polarization with in the age groups of people in their 20s and people in their 60s. It is worth noting the U-shaped curve of income disparity by age groups for all periods, as shown in Figure 2. The IQSR hits the minimum at the age group of people in their 30s, then increases up to the age group of people in their 60s. The income disparity for the age group of people in their 60s has worsened over time. The curvature of the U-shaped curve has recently become greater.

Second, we found that the income disparity with respect to labor income has been lessened by private transfers and other sources of income. Also, the income disparity with respect to market income has been lessened by public transfers and other government subsidies. Third, we tried to find the determinants of income disparity by regression analysis using the panel data for five age groups during the 1990–2014 period. We confirmed the existence of double income polarization from the age groups of people in their 20s and people in their 60s. Also, we found that the labor market environment, such as the proportion of regular jobs, was important in determining the income disparity.

## ACKNOWLEDGMENT

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## Attitude toward Death among the Nursing College Students: A Q-Methodology Study

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### Abstract---

**Objectives:** The aim of this study was to identify the attitude on death among nursing college students in Korea using Q-methodology, to provide a basic data for the development of hospice care curriculum.

**Methods/Statistical analysis:** Q methodology is an integrated research approach that synthesizes the advantage of quantitative and qualitative methods to clarify a subject's point of view about an attitude, phenomenon, interest, or concern. A convenience sample of 43 participants, who were the nursing college students in Cheonansi, Korea, sorted 34 selected Q-statements on a nine-point scale. The collected data were analyzed using QUANL program.

**Findings:** Data analysis identified three factors of awareness towards death in nursing students: recognized life after death, worldly-oriented, and accepted well-dying. The three factors explained 51.9% of the variance: factor I (39.8%), factor II (8.2%), and factor III (3.8%) respectively.

**Improvements/Applications:** The results of the study indicate that different approaches of death educational programs are recommended based on the three types of death attitudes.

**Keywords---** Attitude, Death, Q-Methodology.

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## I. INTRODUCTION

Patterns on awareness about death varies from person to person and the coping behavior in the face of death or dying is various and complicated, vary depending on the social and cultural context, place and method of death, and personal circumstance, feel, and act towards life <sup>1,2</sup>. Comprehending an experience of death and dying have been explored systematically, but this is a question that people have asked since the beginning of history. Death is a universal experience, which is inevitable for all human beings. Therefore, how we face the death is a very serious subject. In addition, it is significant to plan researchers that permit researchers to investigate the social and cultural aspects of death related values, social customs and manners. To take care of the dying person should consider focus to the personal subjectivity of his/her own experiences about death and dying. Most previously published researches are quantitative studies <sup>3</sup> about the death in Korea. Recently, there are a few researches in qualitative method <sup>4,5</sup>. Since death experience is a unique and personal something, it is worthwhile to attempt to explore about the subjective value of death.

Perception of death is a complex concept that many elements of anxiety, such as fear of the dying and the dead. Death is perceived differently to differences in religion, culture, values, experiences, etc. Attitude toward the nurse's death may have an impact on end-of-life patient care <sup>6</sup>. When nursing college students in clinical practice encounter a situation in which they care for dying patients complained of difficulties in nursing and more passive and negative attitude <sup>7</sup>. Even when referring to his or her death and dying process has felt discomfort reported by 36.8% <sup>8</sup>.

When the nurse to recognize death as positive, the patient has a true meaning for death and accept death as positive <sup>9</sup>. This study attempts to provide a basic data for the development of end-of-life care curriculum to be provided with practical skills in the field after graduation, through understanding the meaning and attitudes about nursing college students' death.

Nursing students, as such, prepare to become professional nurses and come to experience more deaths during their theoretical classes or clinical practice compared to students who enter other fields. Nursing students reportedly fear the process of death and its aftermath when witnessing patients die during their clinical practice <sup>10,11</sup>. They also report that they feel a sense of burden, frustration, fright, confusion and anxiety in situations where they must take care of dying patients. The cause of this is reportedly their uncertain attitude toward death <sup>12</sup>. Therefore, as a nurse who will often take care of dying patients not only as an undergraduate student, nursing students require help so as not to develop a narrow, negative view of death. They need to work to develop a proper understanding of death and to learn positive attitudes about dying patients. In addition, they must be prepared by education and training to change the attitudes toward terminal care and make them more positive <sup>13</sup>. To this end, the initial goal is to understand nursing students' attitudes toward death.

## II. METHOD

### A. *Research Design*

This study was conducted applying a Q-methodological approach to identify and describe the attitude on death among nursing college students in Korea.

Q methodology is an integrated research approach that synthesizes the advantage of quantitative and qualitative methods to clarify a subject's point of view about an attitude, phenomenon, interest, or concern. Subjective viewpoints can be defined by internal factors, such as interpersonal relationships, individual attitudes, impressions, perceptions, feelings, and opinions, rather than external facts <sup>14</sup>.

Q methodology involves development of a concourse using diverse sources, production of statements known as the 'Q sample' (or 'Q set'), selection of the participants (the 'P sample' or 'P-set'), and Q sorting using a bipolar Q-sort table designed as a grid (or data collection table). Following these processes, the collected data are analyzed by varimax rotation for factor analysis. Several factors are eventually identified and labelled by a team of domain experts. The participants are asked to accumulate more information about the two most agreeable, and disagreeable, Q statements to aid interpretation of the emerging factors. Q methodology is an efficient method to determine and convert subjective human perceptions into an objective outcome. Results from a Q study not only suggest how people might be approached, but can also predict the very success of the approach. To facilitate this analysis, the Q study protocol was split into three sequential steps: (1) construction of the concourse; (2) facilitating the Q-sorting process; and (3) interpreting data from the Q sorts <sup>15</sup>.

**B. Research Procedure and Data collection**

The Q population was assembled by first reviewing the literature for previous studies, and focus group interviews analyzing to define Q population of statements. After correcting redundant and unclear statements, a total of 118 statements were collected as the Q population. Through this process, a final of 34 Q samples identified as the most representative and instinctive were chosen for use in the Q sorting process.

A sample of 43 participants, who were the nursing college students in Cheonansi, Korea were recruited to participate in the study and agreed to do so. Participants were asked to rank the order of Q samples using a grid called the Q sort table. The participants were Q sorting of each of yielded a systematic forced distribution of 34 Q statements on a scale of 1–9.

**C. Data Analysis**

Principal component analysis for factor analysis using pc-QUANL program was established to reveal groupings or patterns in the data after each participant’s score was entered into the database.

**III. RESULTS**

There were three significant factors of death awareness. The three factors explained 51.9% of the variance: factor I (39.8%), factor II (8.2%), and factor III (3.8%), respectively (Table 1).

Table 1: Eigen Value, Variance for each Factor and Correlation Matrix

		Factor I	Factor II	Factor III
Eigen value, Variances for each factor	Eigen values	17.1231	3.5350	1.6353
	Variance	.3982	.0822	.0380
	Cumulative	.3982	.4804	.5185
		Factor I	Factor II	Factor III
Correlation between types	Factor I	1.000		
	Factor II	.643	1.000	
	Factor III	.541	.482	1.000

**A. Factor 1: Life-Attached**

Nineteen of the 43 participants were identified as factor I. Factor I participants strongly object to the statement that there is something waiting for new life after death (z=1.92). They also stated that the human body decays in death but the soul does not die (z=1.84). Also they want to grow old and die comfortably and naturally (z=1.60) (Table 2).

Participant No. 22, who had the highest factor weight in the factor I group (2.25), stated, “I, as a Christian, believe that there surely exist heaven and hell and that we can have eternal freedom and peace in heaven.”

In sum, the Type 1 participants believe that the present life is filled with pain and hardship but that heaven gives eternal life and greater happiness than that on Earth. They believe there is an afterlife and that their souls will be connected to the world after death; to go to heaven, we have to live life to the fullest now in this world. This group of people is termed ‘recognized life after death’.

Table 2: Item Descriptions and Descending Array of Z-scores for Each Factor

Factor	Item	Q-statements	Z-scores
	3	There is something waiting for new life after death.	1.9
	5	The human body decays in death. But the soul does not die.	1.8
I(n=19)	2	I want to grow old and die comfortably and naturally.	1.6
	6	Choosing his death is a human right.	-1.8
	4	There is no such thing as afterlife.	-2.1
	2	I want to grow old and die comfortably and naturally.	2.0
	29	A person facing death should be given an opportunity to prepare for his death.	1.7
II(n=19)	34	I think he would like to experience a lot of things before he died.	1.3
	23	I think easily about death hits in a difficult situation.	-1.7
	30	I think people who commit suicide have courage.	-1.8
	1	I want to die without pain in an instant when to die.	2.7
	2	I want to grow old and die comfortably and naturally.	2.2
III(n=5)	19	I think that it is better to euthanasia if the patient is hopeless.	1.2
	4	There is no such thing as afterlife	-1.6
	18	If I am sick to die, I will wait quietly for death without treatment.	-1.6

**B. Factor 2: Traditionalist**

Nineteen participants loaded significantly onto Factor II. Factor II participants strongly object to the statement that I want to grow old and die comfortably and naturally (Z=2.04), a person facing death should be given an opportunity to prepare for his death (Z=1.67), and I think he would like to experience a lot of things before he died (Z=1.37) (Table 2).

Participant No. 32, who had the highest factor weight in the factor II group (3.06), stated, "It is natural that any person ages and dies, but now I don't want to think about death," and "I feel death is far away from me yet. When I think about it, I'm scared."

Thus, the Type 2 participants argue that, although death comes to everybody and is unavoidable despite efforts to resist it, they nonetheless do not want to think about death and want to experience as much as they can while they are alive. Hence, these participants are considered as 'worldly oriented' people here.

**C. Factor 3: Death-Rejecter**

Five participants loaded significantly onto Factor III. Factor III participants strongly object to the statement that I want to die without pain in an instant when to die (Z=2.70), to grow old and die comfortably and naturally (Z=2.24) and I think that it is better to euthanasia if the patient is hopeless (Z=1.27) (Table 2).

Participant No. 18 who had the highest factor weight in the factor III group (0.92), stated, "I'm scared about feeling pain," and "A natural death seems happy."

In sum, the Type 3 participants are those who consider their own death as destiny because death is part of life and an individual and fatalistic reality. They simply want to die instantly without pain, and in the case of sustained suffering, they stress a natural death instead of life extension efforts. This group of people is termed the 'accepted dying well' type.

**D. Consensus Views of Attitude Toward Death**

The three types were co-existent despite independent characteristics, and consensus views were found (Table 3). The following quotes sum up the feelings of the majority. Nursing students wanted to grow old naturally, to die with age and to prepare in advance for their death.

Table 3: Consensus Views of Attitude toward Death

Item	Q-statements	Z-score
2	I want to grow old and die comfortably and naturally.	1.96
29	A person facing death should be given an opportunity to prepare for his death.	1.21
15	I accept my fate and, want to live hard and die.	1.60
18	If I am sick to die, I will wait quietly for death without treatment.	-1.08
28	Everyone must face death alone	-1.20
23	I think easily about death hits in a difficult situation.	-1.55

**IV. DISCUSSION**

This study employed the Q methodology to identify types of subjective perceptions of death in nursing students along with the characteristics of the types. As a result of the study, three death perception types held by nursing students were found: recognized life after death, worldly-oriented and accepted dying well.

Those in the Type 1 group recognized life after death. They believe there is a world after death that is connected and that they have souls.

In religious terms about death, the idea of death represents an eternal mystery, akin to religious and philosophical ways of thinking <sup>16</sup>. As in the study by reference 5, death gives feelings of sadness and disconnection, yet, at the same time, a sense of peace and restfulness. They viewed death not as a period of life but as a part of life, naturally moving to another world.

Type 2, the worldly-oriented people contended that death comes to everyone and cannot be refused and is simply unavoidable. Nonetheless, they do not want to think about death at their current stage of life and want to experience as much as they can while they are alive. They value their life and plan to experience many things, share with many others, and realize their potential. This finding is similar to the findings by reference

5, who considered it to be foolish to worry about or develop a fear of death in advance, as it is not helpful and does nothing but make life feel futile while also disturbing one's actual life. Therefore, we should live our lives to the fullest and achieve what we can achieve before we die. If we do this, our lives will be fulfilling.

Type 3, termed the accepted dying well group, considers death as a part of life and as destiny. They want death without pain instantly while emphasizing a natural death rather than an extended life. In a study on attitudes toward death, students studying emergency rescue methods<sup>17</sup> scored 2.35 on average out of 4, while nursing students<sup>11</sup> scored 2.63, showing a relatively positive attitude toward death. In a study by<sup>14</sup>, their participants scored 3.08, the highest, out of the full score of 4 on the item 'I am not especially scared even at the thought of having cancer'. As this result shows, some students seem to accept death positively.

Thus, the accepted dying well group will need to receive preparatory education regarding death or an opportunity to frankly talk about death so that they can further solidify their attitudes about death with continuous encouragement.

Presently, in South Korea, terminal care is not a single independent subject in university curricula. Instead, it has been taught only in a few colleges.

It is necessary to help nursing students develop a positive attitude toward terminal care, as nurses in the clinical field often face dying patients. In this sense, study of an awareness of death is expected to help nursing students understand the diverse forms of life, the value of life, and related life and death issues while also establishing a desirable view of life. Based on the findings here, it is deemed necessary to develop an appropriate terminal care educational program considering nursing students' levels of subjectivity about death and its significance.

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# The Effects of TBL on Learning Attitude, Self-directed Learning Ability, Team Efficacy, Interpersonal Understanding, and Proactivity in Problem Solving Among Nursing Students

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## Abstract---

**Background/Objectives:** The purpose of the study was to examine the effects of TBL on learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving.

**Methods/Statistical analysis:** Fifty third grade nursing students participated. The TBL program used in this study was carried out a total of 6 hours across 4 sessions. The program had 2 topics of conceptual model and therapeutic communication of psychiatric nursing and each topic was conducted over 2 sessions for 3 hours. The pre-survey was performed on March 2, 2015 and the post-questionnaire was conducted on April 2, 2015.

**Findings:** After the classes applying TBL, we found statistically significant differences: students in the high satisfaction with interpersonal relationships group showed higher directed learning ability ( $t = 3.39, p = .001$ ), team efficacy ( $t = 2.83, p = .007$ ), interpersonal understanding ( $t = 2.72, p = .009$ ), and proactivity in problem solving ( $t = 2.88, p = .006$ ) than did those in the low satisfaction with interpersonal relationships group. We found an additional statistically significant difference, with the extrovert group showing higher proactivity in problem solving ( $t = 2.74, p = .008$ ) than did the introvert group. After the classes applying TBL, significant improvements were found in learning attitude ( $t = -2.69, p = .010$ ), self-directed learning ability ( $t = -2.15, p = .036$ ), team efficacy ( $t = -8.28, p < .001$ ), interpersonal understanding ( $t = -4.37, p < .001$ ), and proactivity in problem solving ( $t = -3.80, p < .001$ ).

**Improvements/Applications:** The study can provide basic data to develop nursing education that enhances the practice capacities. More TBL education should be utilized to improve the learning ability of nursing students.

**Keywords---** TBL, Learning Attitude, Self-Directed Learning Ability, Team Efficacy, Interpersonal Understanding, Proactivity in Problem Solving.

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## **I. INTRODUCTION**

### **A. *The Necessity for this Research***

Clinical practice is conducted through the cooperation of experts in various situations, and team performance is very important. In addition, there is a trend regarding educational methods that can lead to learning as well as learning interests, to confirm the learner-centered educational environment that has been emphasized recently.

Team-based learning (TBL) is a teaching-learning method developed based on the constructivist theory of education that views learning not as an act of passive reception of information from another person but as an active construction of the learner. This learning method is different from unstructured small-group learning or cooperative learning that does not require any structural variation. Thus, it is an instructional strategy that provides opportunities for learning teams to participate in meaningful learning tasks by centralized team-based, small group activities, and supporting the teams to maximize their outcomes<sup>1</sup>. Hence, even for learners with difficulties in learning, the application of TBL would allow them to successfully accomplish their studies through the support of their peers. It is expected that this process would not only improve self-directed learning ability but also enhance problem solving skills and team efficacy, which are essential for recent clinical situations that are complex and diverse.

Existing research findings on team learning are as follows. Kwon<sup>2</sup> used team project learning for 37 female college students taking an educational technology course, and the results showed that team efficacy and interpersonal understanding were positively correlated with the team project scores. Janagam and Jeyamani<sup>3</sup> used task based learning for 61 M.A economics students and found that intrinsic goal orientation, task value, use of elaboration learning strategies, critical thinking, meta cognitive self-regulation, effort regulation, and peer learning had improved. Seo<sup>4</sup> used team-based learning in the field of adult nursing for 62 nursing college students and showed that communication ability, problem solving ability, self-directed learning ability, learning attitude, and knowledge achievement had improved.

Han<sup>5</sup> used team-based learning about adult nursing for 40 nursing college students and the results showed that learning motivation and learning attitude had improved. Park and Hahn<sup>6</sup> used simulation-based team learning on COPD cases for 55 nursing college students and showed that communication and team performance were correlated. Oh<sup>7</sup> used 52 experimental group and 54 control group participants consisting of nursing college students, and applied team-based learning about adult nursing; the results demonstrated that problem solving skills and class satisfaction were significantly higher for the experimental group. Park and Yim<sup>8</sup> performed a study using 166 subjects and the results showed that attitude toward learning and team efficacy influenced interpersonal relationships, and that interpersonal relationships and problem solving capability acted as mediators between team efficacy, attitude toward learning, and class satisfaction.

As shown above, team-based learning is not only a teaching-learning method that induces interest in learning and is suitable for learner-centered education environments that have been emphasized recently, but is also a highly necessary learning method for nursing college students entering clinical practice. However, there is a lack of research investigating its effects on nursing college students when applied to nursing courses, and it was difficult to find research that verified the effects using psychiatric nursing classes.

In the present study, an examination of the impact of TBL on learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving was conducted in a psychiatric nursing class. This investigation was performed to explore alternatives to traditional teaching and to confirm the applicability of TBL as a nursing educational method.

### **B. *Purpose of this Study***

The aim of this study is to provide an alternative to the traditional learning method that would increase the interpersonal ability and problem solving ability of nursing college students to improve their practical, clinical competency. Specifically, the aim is to evaluate the effects of TBL on the learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving of nursing students.

- 1) Identify whether there are differences between the learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving depending on the general characteristics of the subjects.
- 2) Investigate the effects of TBL on the learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving of the subjects.

### C. Definitions of Terms

TBL refers to teaching and learning strategies that are structured to maximize individual and team performance through the interactions between team members, and individuals' prior learning on the given problematic situation<sup>1</sup>.

In this study it refers to the teaching-learning method with a preparation stage, application stage, and evaluation stage using a total of 7 teams, each composed of 7-8 members.

## II. STUDY METHOD

### A. Study Design

This study followed an experimental single group pre-post design. Before applying the TBL method in a psychiatric nursing course, general characteristics, learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving were measured. After the experimental treatment, learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving were measured a second time (Table 1).

Table 1: Research design

Group	Pretest	Treatment	Posttest
Experimental group	Ye1	X	Ye2

### B. Participants

An analysis using G\*Power 3.1.9.2<sup>9</sup> showed that the sample size was sufficient because it exceeded the suggested number of 45 subjects based on calculations using an effect size of .5, a significance level of .05, and statistical power of .80 based on a t-test. Fifty third grade nursing students in "D" city participated in the study. After applying the TBL method in a psychiatric nursing course, the data for 50 students (100% response rate) were analyzed.

### C. Instruments

#### Learning Attitude

The instrument was developed by the Korean Educational Development Institute<sup>10</sup> and edited and complemented by Hwang<sup>11</sup> to measure the learning attitude of nursing college students. A total of 16 questions have a range of 16-90 points based on a 5-point Likert scale, and higher scores indicate a better learning attitude. The Cronbach's  $\alpha$  was .84 in the research by Hwang<sup>11</sup> and it was .82 in this study.

#### Self-Directed Learning Ability

The instrument developed by the Korean Educational Development Institute<sup>12</sup> was used. A total of 40 questions have a range between 40-200 points, based on a 5-point Likert scale, and higher scores indicate better self-directed learning ability. The Cronbach's  $\alpha$  at the time of development was .92 and it was .87 in this study.

#### Team Efficacy

The Collective-Efficacy Trait Subscale by O'Neil and Herl<sup>13</sup>, complemented by Marshall<sup>14</sup>, and translated by Kwon<sup>2</sup>, was used. A total of 8 questions have a range from 8-40 points based on a 5-point Likert scale, and higher scores indicate better team efficacy. In the study by Marshall<sup>14</sup> the Cronbach's  $\alpha$  was .89 and in this study it was .93.

### ***Interpersonal Understanding***

The group efficacy characteristic subscale used in the study by Marshall<sup>14</sup> and adapted and edited by Kwon<sup>2</sup> was used. A total of 11 questions have a range between 11-55 points based on a 5-point Likert scale, and higher scores indicate better interpersonal relations. The Cronbach's  $\alpha$  in the study by Marshall<sup>14</sup> was .86 and it was .91 in this study.

### ***Pro activity in Problem Solving***

The group efficacy characteristic subscale used in the study by Marshall<sup>14</sup> and adapted and edited by Kwon<sup>2</sup> was used. A total of 8 questions have a range between 8-40 points based on a 5-point Likert scale, and higher scores indicate better proactivity in problem solving. The Cronbach's  $\alpha$  in the study by Marshall<sup>14</sup> was .86 and in this study it was .80.

### ***D. Experimental Treatment***

The TBL program used in this study was carried out in a 3-credit psychiatric nursing course for a total of 6 hours across 4 sessions. The program had 2 topics of "contents of the conceptual model" and "therapeutic communication of psychiatric nursing" and each topic was conducted over 2 sessions for 3 hours. The pre-survey was performed on March 2, 2015 and the post-questionnaire was conducted on April 2, 2015 (Table 2).

Table 2: Contents of team-based Learning

Session	Theme
1	Conceptual model of psychiatric nursing
2	
3	Therapeutic communication of psychiatric nursing
4	

The classes were carried out according to the stages of a TBL course in the following order.

#### ***Level 1 Preparation Stage***

##### **1) Pre-class planning and self-learning**

The instructor planned the TBL course, provided an orientation to TBL 1 week before the beginning of the course, and assigned the teams after providing a structured questionnaire. The team assignment randomly divided 7 teams of 7-8 members each, and the students were told to identify their team members. The topics of the team-based classes were introduced and the students were told to read the relevant sections on the topics from the textbook and perform self-study before participating in the class.

##### **2) Readiness assurance process (RAP)**

The TBL course was performed concerning the conceptual model of psychiatric nursing in the 3 hours of the first week, and concerning therapeutic communication in the 3 hours of the second week. For each topic, tests for individual readiness assurance process (IRAP) and group readiness assurance process (GRAP) were conducted.

The questions of the readiness assurance test were the same for both individuals and groups. The 10 multiple choice question problems were developed by myself based on the questions from the national examination. The learners received corrections to the questions they got wrong after checking the answers and the instructors provided verbal feedback.

#### ***Level 2 Application Stage***

For application of the learning contents, the students were presented with cases based on clinical precedents about resolving the nursing problems of personality disorder subjects.

The learners discussed the topics in teams, and after the team presentation the instructor compared the answers of the teams and provided feedback on the quality of answers for each team.

#### ***Level 3 Evaluation Stage***

The learners evaluated the contributions of their team members. Individual performance, team performance, and contributions of team members were checked.

### E. Ethical Consideration

The aim and procedure of the study, and the guarantee of anonymity were explained to the participants, and they were informed about their freedom to withdraw their participation at any point of the research without any disadvantage from their withdrawal.

### F. Analysis

The data collected in the present study were analyzed using SPSS 22.0.

- 1) General characteristics were analyzed by frequencies and percentages.
- 2) For the differences in learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving according to general characteristics, independent t-tests and ANOVA were used.
- 3) For the differences in variables between pretest and posttest, paired t-tests were also used.

## III. STUDY RESULTS

### A. General Characteristics of the Subjects

The mean age was 21.9 and there were 47 females (94%). "none" was the most common response for religion, provided by 30 subjects (60%) and "introvert" was most the prevalent response for personality type (30 subjects, 60%). "satisfied" was the most prevalent response for satisfaction with major, provided by 47 subjects (94%) and similarly "satisfied" was the most common response for satisfaction, with interpersonal relationships provided by 47 subjects (94%). For preferred teaching and learning method, lecture method was the most prevalent response, provided by 41 subjects (82%) (Table 3).

Table 3: The General Characteristics of the Subjects

(N = 50)			
Characteristics	Categories	N (%)	Mean (SD)
Age (year)	20-21	13 (26)	21.9 (1.02)
	22	30 (60)	
	23-26	7 (14)	
Gender	Male	3 (6.0)	
	Female	47 (94.0)	
Religion	Protestant	12 (24.0)	
	Catholic	5 (10.0)	
	Buddhist	3 (6.0)	
	None	30 (60.0)	
Personality type	Extrovert	20 (40.0)	
	Introvert	30 (60.0)	
Satisfaction with major	Satisfied	47 (94.0)	
	Unsatisfied	3 (6.0)	
Satisfaction with interpersonal relationships	Satisfied	47 (94.0)	
	Unsatisfied	3 (6.0)	
Preferred teaching and learning method	Lecture method	41 (82.0)	
	Case-based method	5 (10.0)	
	Others	4 (8.0)	

### B. Differences in Variables According to General Characteristics

We hypothesized that there would be significant differences in the variables of nursing students according to their general characteristics.

When we tested this hypothesis, we found statistically significant differences: students in the high satisfaction with interpersonal relationships group showed higher directed learning ability ( $t = 3.39, p = .001$ ), team efficacy ( $t = 2.83, p = .007$ ), interpersonal understanding ( $t = 2.72, p = .009$ ), and proactivity in problem solving ( $t = 2.88, p = .006$ ) than did those in the low satisfaction with interpersonal relationships group.

We found an additional statistically significant difference, with the extrovert group showing higher proactivity in problem solving ( $t = 2.74, p = .008$ ) than did the introvert group (Table 4).

Table 4: Differences in Variables According to General Characteristics

Characteristics	Categories	Learning attitude		Self-directed learning ability		Team efficacy		Interpersonal understanding		Proactivity in problem solving	
		M (SD)	t	M (SD)	t	M (SD)	t	M (SD)	t	M (SD)	t
Gender	Male	49.6 (8.02)	-0.60	122.0 (24.51)	-2.13*	29.0 (4.58)	1.04	44.3 (5.62)	1.35	25.6 (3.78)	-1.54
	Female	51.9 (6.32)		137.7 (11.56)		26.2 (4.33)		40.7 (4.31)		28.4 (2.98)	
Character-oriented	Extrovert	53.7 (4.25)	1.76	137.9 (10.69)	0.53	27.0 (3.70)	0.78	41.9 (3.76)	1.18	29.6 (2.58)	2.74**
	Introvert	50.5 (7.24)		135.9 (14.17)		26.0 (4.74)		40.4 (4.77)		27.3 (3.05)	
Satisfaction with Interpersonal Relationships	Satisfied	52.2 (6.28)	1.97	138.1 (11.41)	3.39**	26.8 (4.04)	2.83**	41.4 (4.20)	2.72**	28.5 (2.91)	2.88**
	Unsatisfied	45.0 (3.0)		114.6 (15.69)		20.0 (4.58)		34.6 (2.88)		23.6 (0.57)	

\* $p < .05$ , \*\* $p < .01$ 

### C. Differences in Variables between Pretest and Posttest

After the classes applying TBL, significant improvements were found in learning attitude ( $t = -2.69$ ,  $p = .010$ ), self-directed learning ability ( $t = -2.15$ ,  $p = .036$ ), team efficacy ( $t = -8.28$ ,  $p < .001$ ), interpersonal understanding ( $t = -4.37$ ,  $p < .001$ ), and proactivity in problem solving ( $t = -3.80$ ,  $p < .001$ ) (Table 5).

Table 5: Differences in Variables between Pretest and Posttest

(N = 50)

Variables	Pretest	Posttest	Difference	T (p)
	Mean (SD)	Mean (SD)	Mean (SD)	
Learning attitude	51.8 (6.36)	55.1 (5.06)	-3.2 (8.61)	-2.69 (.010)
Self-directed learning ability	136.7 (12.81)	142.9 (15.03)	-6.1 (20.14)	-2.15 (.036)
Team efficacy	26.4 (4.34)	32.9 (3.62)	-6.4 (5.49)	-8.28 (<.001)
Interpersonal understanding	41.0 (4.42)	44.3 (4.19)	-3.3 (5.43)	-4.37 (<.001)
Proactivity in problem solving	28.2 (3.06)	30.9 (3.75)	-2.6 (4.90)	-3.80 (<.001)

## IV. DISCUSSION

The results of this study showed a significant difference between genders in self-directed learning ability. This is similar to the results by Kim<sup>15</sup>, Moon, Bak and Yang<sup>16</sup>, but different from the findings of Kim<sup>17</sup>. The self-directed learning program of Kim<sup>17</sup> was applied to male and female subjects and the results showed changes in certain sub-factors that are either common or different across gender. These should not be understood as genetic factors, environmental factors, or factors that differ among the characteristics of the learner, but as the acquisition of the ability to control and manage the specific situation and context in which the learning occurs<sup>18</sup>. Moreover, the number of males was relatively small compared to the number of females in the present study, so further investigation that compensates for such limitations is required in future studies.

The results of this study demonstrated difference across personalities in proactivity in problem solving. The study by Sung and Han<sup>19</sup> showed a significantly positive correlation between problem solving actions and personality. People who are more proactive in problem solving tend to be more creative, and creativity is related to a confident and active personality<sup>20</sup>. Therefore, it is necessary to encourage active self-expression and to build an environment that supports flexible problem solving.

Self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving showed significant differences according to satisfaction with interpersonal relationships. This corresponds to the findings of Park<sup>21</sup>, Won and Shin<sup>22</sup>, and Kim<sup>23</sup>. Self-directed learning ability is a learning method that acquires necessary knowledge using cognitive, motivational, and behavioral techniques through cooperation with peers or reflective self-examination<sup>21</sup>. Healthy interpersonal relations are required to achieve this, so self-directed learning ability would differ with the level of satisfaction with interpersonal relationships. Hence, in order to improve active self-directed learning ability, skills for proficient building of interpersonal relations should be prioritized. The small group based communication training by Won and Shin<sup>22</sup> improved interpersonal understanding by significantly increasing understanding and openness to people. The increased satisfaction with interpersonal relationships advanced the interactions among team

members by improving communication ability, and this in turn changed the team dynamics and amplified team efficacy. In order to increase team efficacy and interpersonal understanding, it is necessary to assess and improve satisfaction with interpersonal relationships. The study by Kim<sup>23</sup> showed that resolution based communication training applied to nursing college students increased their familiarity, openness, and understanding of themselves and others, improved satisfaction with interpersonal relationships, and increased confidence and proactivity in problem solving, through being mutually influenced by each other's problem solving methods and strengths. Hence, satisfaction with interpersonal relationships induces proactivity by improving one's confidence in problem solving. Therefore, in order to increase proactivity in problem solving, efforts to improve satisfaction with interpersonal relationships along with reinforcement of positive changes or accomplishments are necessary.

Teaching the contents of the conceptual model and therapeutic communication of psychiatric nursing using TBL resulted in significant changes in all variables. Such results are in line with the findings of Han<sup>5</sup>. In TBL, the learner proactively structures and creates knowledge in an active position. Moreover, it is a teaching method based on the close relationship between the learner and the instructor, in which the cooperation and collaboration between learners play a pivotal role<sup>24</sup>. This seems to explain why learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving all showed significant differences. Moreover, therapeutic communication is a nursing method that explores, analyzes, and solves problems using various linguistic and non-linguistic techniques based on deep empathetic understanding with the subject<sup>25</sup>. The findings of Oh and Han<sup>25</sup> showed that after teaching therapeutic communication to the students during a psychiatric nursing course, the students acquired more knowledge and were more empathetically understanding of the words of the subjects through open communication methods such as reflection and restatement. This indicates that therapeutic communication allows efficient understanding of interpersonal relationships, helps team efficacy, and enables a more proactive approach in problem solving.

## V. CONCLUSION

This research taught psychiatric nursing principles and therapeutic communication using TBL methods to verify whether significant changes would be shown in learning attitude, self-directed learning ability, team efficacy, interpersonal understanding, and proactivity in problem solving. After the classes applying TBL, we found statistically significant differences. Therefore, more TBL education should be utilized to improve the learning ability and interpersonal skills of nursing college students.

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# Effect of a Course on Interpersonal Relationships and Communication on the Interpersonal Relationships, Communication Skills, and Ego States of Nursing Students

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## Abstract---

**Background/Objectives:** The purpose of this study was to examine the effects of an interpersonal relationships and communication course on interpersonal relationships, communication skills, and ego-states.

**Methods/Statistical analysis:** The subjects were 49 first-grade nursing students. Before and after implementing the interpersonal relationships and communication course, the general characteristics, interpersonal relationships, communication skills, and ego states of the students were assessed. The course consisted of 15 weeks from September 3 to November 26, 2015. Lectures were conducted for 100 minutes per class, and 13 times in total, except for one week each during the mid-term and final examinations.

**Findings:** After the course, significant improvement was found in different variables. After the interpersonal relationships and communication course, significant improvement was found in the scores on interpersonal relationships ( $t = -2.13$ ,  $p = .039$ ), communication skills ( $t = -3.52$ ,  $p = .001$ ), and the ego state of Free Child ( $t = -2.47$ ,  $p = .018$ )

**Improvements/Applications:** The implication of this study is found in that it investigated the effectiveness of the course through group activities, training of various interpersonal skills, and communication skills instead of delivering lectures.

**Keywords---** Communication Curriculum, Interpersonal Relationships, Communication Skills, Ego State, Nursing Students.

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## I. INTRODUCTION

### A. Need for the Present Study

The range of health problems is more varied in modern societies than ever before, and the trend of solving these problems has shifted from complete recovery to management. Therefore, even in clinical practice, nursing based on interpersonal relationships, including communication with the medical team and patients, and education of patients, has greater importance now than it had before. Human life consists of endless types of interpersonal relationships, and when that aspect is not satisfied, it causes alienation and loneliness<sup>1</sup>. Therefore, establishing a therapeutic relationship is a highly important part of nursing, which influences the effect of treatment. The Korea Accreditation Board of Nursing Education (KABONE), which performs an essential assessment that is mandatory for most nursing colleges in Korea, recently listed the suggested core competences of nurses and program outcomes of nursing education. The core contents include communication between different specializations to improve patients' health<sup>2</sup>.

Nurses are required to establish interpersonal relationships in specific situations in nursing practice, such as risk situations<sup>3</sup>. Thus objective self-awareness through understanding one's ego state is very important for nursing students in order to maintain reliable interpersonal relationships with patients<sup>4</sup>, as is the perception of one's own and others' emotions that influence interpersonal relationships<sup>5</sup>.

In essence, what matters in nursing practice after theoretically acquiring interpersonal and communication skills through textbooks is to practice the formation of relationships with patients in reality. Therefore, a course on interpersonal relationships and communication, which helps nursing students form therapeutic interpersonal relationships and perform therapeutic communication within nursing education, should include various drills and exercises that will be helpful in real situations. Lastly, it is necessary to study whether such a course would be really effective in improving interpersonal skills and communications skills, and what effect it has on the ego state of nursing students who have great academic pressure<sup>6</sup> due to the excessive amount of studying, because nursing, as a field of study dealing with human life, requires more varied major and training courses as compared to non-nursing courses.

### B. Purpose of the Study

The fundamental objectives of this study were to improve the interpersonal relationships and communication skills of nursing students, and to increase their nursing competences in clinical practice. Concretely, the study aimed to assess the effect of the course "interpersonal relationships and communication skills" on the interpersonal relationships, communication skills, and ego state of nursing students.

## II. STUDY METHOD

### A. Study Design

This study applied an experimental, single group pre-post design.

Before implementing the interpersonal relationships and communication course, the general characteristics, interpersonal relationships, communication skills, and ego states of the students were assessed.

After the experimental treatment, their interpersonal relationships, communication skills, and ego states were reassessed (Table 1).

Table 1: Research Design

Group	Pretest	Treatment	Posttest
Experimental group	Ye1	X	Ye2

## **B. Participants**

The subjects were 49 first-grade nursing students from D city. The sample size was calculated using G\*Power 3.1.9.2<sup>7</sup>. For a t-test, an effect size of .5, a significance level of .05, and a test power of .80, the recommended number of subjects was 45. Thus, the requirement was satisfied. After applying the interpersonal relationships and communication course to 49 students, data on some students were missing for the major measurement variable in the pre/post-survey; thus, the data on 45 subjects (91.8%) were finally analyzed.

## **C. Instruments**

- 1) For the questionnaire, the Relationship Change Scale by Schlein and Guerney<sup>8</sup>, which had been adapted to the Korean environment by Moon<sup>9</sup> was used. A 5-point Likert scale was applied to a total of 25 questions, with a score range of 25–125 points, where higher scores indicated better interpersonal relationships. The Cronbach's  $\alpha$  of the tool was .88 in the study in which it was developed, and was .79 in the present study.
- 2) Communication skills were measured using the 40-item questionnaire developed by Bienvenu<sup>10</sup> and translated by Kang<sup>11</sup>. It contains a total of 40 questions that are rated on a 5-point Likert scale. The scores range between 40 and 200 points, and higher score indicates better communication skills. The Cronbach's  $\alpha$  of the tool in the study by Lee<sup>12</sup> was .70 and .84, respectively for each sub-category, and that in the present study was .76.
- 3) Ego state was measured using a scale comprising 50 questions standardized by the Korea Transactional Analysis Association from the Ego gram checklist developed by Berne<sup>13</sup>. Each question was measured using a 5-point scale, and higher scores indicated a higher level of psychological energy of the ego type. Each ego state, Critical Parent (CP), Nurturing Parent (NP), Adult (A), Free Child (FC), and Adapted Child (AC), had 10 questions, and the full score for each ego state was 50 points. The Cronbach's  $\alpha$  of the tool in the study in which it was developed was 0.74, and that in the present study was 0.78.

## **D. Experimental Treatment**

In this study, the course "interpersonal relationships and communication," which was offered in the fall semester of 1<sup>st</sup> year, with 2 credits of 2 hours per week, was implemented along the following 4 stages: in Stage 1, the lecturer explained the learning objectives and theoretical content; in Stage 2, related assignments were suggested to students, and they learned communication techniques through various learning activities, including exercises and role playing; in Stage 3, they shared their experiences from the learning activities that were performed in small groups and in class; and in Stage 4, the lecturer demonstrated the association of the shared experiences with the theories. The course consisted of 15 weeks from September 3 to November 26, 2015. Lectures were conducted for 100 minutes per class, and 13 times in total, except for one week each during the mid-term and final examinations.

The objectives of the course were to: 1) develop the ability to understand oneself and others, and to comprehend the importance of interpersonal relationships; 2) learn theories and concepts related to interpersonal relationships and communication, and apply them to nursing practice; 3) apply therapeutic communication techniques in communicational situations; and 4) acquire effective communication techniques, and maintain mature interpersonal relationships.

To achieve these objectives, the course syllabus consisted of the following: an orientation on the interpersonal relationships and communication course, covered in Lecture 1; understanding interpersonal relationships, covered in Lecture 2 to 4; communication, covered in Lecture 5 to 7; and simulation for communication in nursing practice for students to apply therapeutic communication techniques, covered in Lecture 9 to 14 (Table 2).

Table 2: Themes of Interpersonal Relationships and Communication Education

Session	Theme	Learning Activity
1	Orientation	Mapping of interpersonal relationships
2	Introduction of interpersonal relationships and communication	Analyzing communication styles
3	Individual differences	Describing one's life line
4	Self-perception	Assessing ego state
5	Verbal communication	Game: Describing a picture and explaining the details to others
6	Nonverbal communication	Practice: Reading the emotions suggested by facial expressions
7	Connecting in the practical setting	Practice: Posturing, portraying a positive image, maintaining eye contact, smiling, and playing several roles
8	Attending in the practical setting	Assessing listening skills, constructing a dialog, and playing several roles
9	Responding in the practical setting	Training of empathy, silence, acceptance, and genuineness. Confirming feelings
10	Empowering in the practical setting	Practice: Praising, providing recognition, feedback, offering information, family support, and giving hope to others. Assertiveness training, strengthening self-competence, self-encouragement
11	Understanding in the practical setting	Practice: Communicating with children, adolescents, elderly, and clients with a handicap
12	Problem solving in the practical setting	Practice: Conflict management
13	Therapeutic communication in the practical setting	Application practice: Therapeutic communication techniques

### E. Analysis

The data collected in the present study were analyzed using SPSS 22.0.

- 1) Descriptive statistics were used to examine the general characteristics of subjects.
- 2) To examine the differences between the pretest and posttest scores, paired t-tests were used.

## III. STUDY RESULTS

### A. General Characteristics of the Subjects

The general characteristics of the subjects were as follows: 37 subjects were aged under 19 years (93.3%), 8 were aged over 20 years (6.7%), and 40 were female (88.9%) (Table 3).

Table 3: General Characteristics of the Subjects

(N = 45)

Characteristics	Categories	N(%)	Mean(SD)
Age(years)	18-19	37(93.3)	19.2(0.88)
	20-23	8(6.7)	
Gender	Male	5(11.1)	
	Female	40(88.9)	
Religion	None	21(46.7)	
	Protestant	12(26.7)	
	Catholic	2(4.4)	
	Others	10(22.2)	

### B. Differences between Pretest and Posttest Scores

After the interpersonal relationships and communication course, significant improvement was found in the scores on interpersonal relationships ( $t = -2.13$ ,  $p = .039$ ), communication skills ( $t = -3.52$ ,  $p = .001$ ), and the ego state of Free Child ( $t = -2.47$ ,  $p = .018$ ) (Table 4).

Table 4: Differences between Pretest and Posttest Scores

(N = 45)

Variables	Pretest	Posttest	Difference	t(p)	
	M(SD)	M(SD)	M(SD)		
Interpersonal Relationships	87.2(12.88)	91.4(9.36)	-4.2(13.30)	-2.13(.039)	
Communication Skills	111.4(11.70)	115.6(13.87)	-4.1(7.88)	-3.52(.001)	
Ego State	CP	26.5(4.72)	27.4(3.42)	-.89(5.93)	-1.01(.320)
	NP	37.5(4.48)	37.4(3.64)	.11(5.20)	.14(.887)
	A	32.5(5.58)	33.7(4.68)	-1.27(7.47)	-1.14(.261)
	FC	32.0(4.80)	34.1(4.47)	-2.04(5.56)	-2.47(.018)
	AC	30.3(5.11)	31.8(5.05)	-1.51(6.65)	-1.53(.135)

CP = Critical Parent, NP = Nurturing Parent, A = Adult, FC = Free Child, AC = Adapted Child

#### IV. DISCUSSION

This study examined the effect of the course "interpersonal relationships and communication" offered for freshmen at the department of nursing science on their ego state. The course also aimed to help improve their interpersonal relationships and communication skills. In this study, the original course design of 2 credits and 2 hours per week was implemented. Additionally, group activities were conducted for a more realistic effect in a limited environment. This study was conducted based on a single group pretest-posttest design, as having a control group would raise ethical concerns. Therefore, the study results shall not be over interpreted, as it was conducted with a single group of nursing students from just one college, and the researcher conducted the survey himself, which might have influenced the effect of the experiment.

Findings revealed that the course influenced the increase of the score of the ego state FC. This is in accordance with the results of a study by Sim and Ahn<sup>14</sup>, which examined 144 nursing students, and the group with higher FC ego state scored high, with a statistical significance in communication skills ( $t=-5.062, p<.001$ ). The study also corroborates the findings of Jung<sup>15</sup> that the FC ego state and interpersonal relationships showed a statistically significant positive correlation ( $r=0.498, p<.001$ ). It is thought that the group activities and role plays included in the interpersonal relationships and communication course in this study activated the energy<sup>15</sup> that encourages flexible thinking and creativity, which are positive characteristics of the FC ego state, helpful to interpersonal relationships. Therefore, it is necessary to develop course approaches that can activate the energy of the ego state FC in order to increase the effectiveness of the course.

Our study was effective in enhancing interpersonal relationships and communication skills. The results of our study correspond to those of previous studies that applied various group activities and educational methods for nursing students in lecture room environments and courses for communication<sup>16,17,18,19,20</sup>. Our results are supported by previous study results that communication education was not effective when it mainly consisted of lectures and theories, and that course designs that encourage the participation and experience of students are effective<sup>17,21,22</sup>. Therefore, although it is difficult, in reality, to carry out group activities with a large number of students, it is still necessary to develop and apply a variety of course methods employing group activities to ensure the effectiveness of an interpersonal relationships and communication course. While the practical importance of the course on interpersonal relationships and communication is tremendous, in order to achieve its effectiveness, the real difficulties that arise during group activities with a large number of students should be taken in to account. In future, further research is recommended concerning the effectiveness of the course with more varied numbers of students.

In this study, we conducted a real course on interpersonal relationships and communication, albeit within a limited time, with a large number of students. The implication of this study is found in that it investigated the effectiveness of the course through group activities, training of various interpersonal skills, and communication skills instead of merely delivering lectures.

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# Learners' Motivation for Learning and Influential Variables on Segmented Learner Group (Market) of Lifelong Distance Education Academic Credit Bank System

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## Abstract---

**Background/Objectives:** Despite the increase in degrees bestowed through the academic credit bank system, practical research in the advancement of the quality of its organization has been insufficient. The purpose of this research is to provide practical implications for crucial marketing strategy and institutional policy-making through the data analyses of the factors of learners' motivation for learning and the study of the characteristics of segmented learner group.

**Methods/Statistical analysis:** Factor analysis, Cluster analysis, and Multinomial Logit models were used in the analysis of the data. MANOVA was performed to verify the validity of the cluster types, and each cluster was determined to carry statistical significance.

**Findings:** The main factors which influenced academic credit bank learners' motivation to learn were happiness of the family, desire for learning, other people's recommendation, professional development, use of leisure time, opportunities for new challenges, and admission to higher education institutions.

**Improvements/Applications:** It is believed that the application of more diverse factor variables such as learners' psychological factors and lifestyle may bring forth a more improved results in future research.

**Keywords---** Lifelong Distance Education, Academic Credit Bank System, Learning Motivation, Multinomial Logit Model, Market Segmentation.

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## I. INTRODUCTION

Academic Credit Bank is a system which was developed to facilitate the acquisition of a degree when a given criteria is satisfied by allowing cumulative recognition of credits from classes taken at school as well as variety of classes taken outside school. In Korea, this system came about in 1995 by the presidential Education Reform Commission during a conference in which a vision for a new education system to foster the development of lifelong learning was proposed and other relevant legislation was enacted regarding credit recognition; it was carried out in March 1998<sup>1</sup>. Thus, according to this policy enforcement and background, while there were 11,780 bachelor's degrees, 23,216 associate's degrees in 2012, based on only the first half of 2013, there were 12,580 people who received the Bachelor's degrees and 24,102 people who received the associate's degrees through academic credit bank and degree-by-examination system. Furthermore, in 2015 academic credit bank and degree-by-examination commencement ceremony, a total of 31,171 degrees were conferred in the name of the Ministry of Education of which 29,813 earned were Bachelor's and Associate's degrees while 1,358 were degree-by-examination degrees. Thus, there has been a gradual increase in the number of learners earning degrees through the academic credit bank every year.

Academic credit bank system can be categorized into two types of programs-attendance-based and online. The institutions which facilitate the credit bank system are commonly referred to as distance education or lifelong distance education institutions. These institutions are generally operated by affiliated university centers or general private sector institutions. As of 2015, there are approximately 86 diverse academic credit bank institutions and participating learners' demand for this academic credit bank education has been increasing steadily. This fact suggests that meticulous studies on academic credit bank education and its learners participating in lifelong education is much needed. Although establishment and quantitative growth of academic credit bank system has been of utmost urgency up until now, there is a much need for research which promotes qualitative growth. In other words, there has been insufficient research which provides practical assistance to institutional operations wherein the relationship between the learner and effective learning was the premise.

Therefore, the aim of this study is to estimate the motivational factors of online-based academic credit bank learners through the analysis of their learning motivations regarding academic institutions; then on the basis of these factors, to determine the cluster types in order to determine the learner group. In other words, through market segmentation, to determine the causal relationship of each cluster and the variables of demographic characteristics. The results of the analysis will provide lifelong education associated government institutions and lifelong distance education institutions with fundamental basic data necessary for publicity, marketing strategy, and operations needed for policy-making and recruitment.

## II. LITERATURE REVIEW

Previous domestic research related to academic credit bank system has to do with management and improvement, status and performance, curriculum and assessment; most of all previous studies were identified as qualitative research related to institutional improvement. Moreover, previous research related to online distance education is considered to be similar to studies related to attendance-based academic credit bank system.

The motivations of learners of cyber learning and face-to-face were categorized as others' recommendation, need for certification, admission to higher education institutions, as well as pleasure of learning<sup>2</sup>. Moreover, in another early research, these were categorized as better occupation (44%), interest in the subject (7.5%), new major (31.9%), others' recommendation (7.0%), and others (9.7%)<sup>3</sup>.

In a recent study the motivational factors were determined to be the pursuit of social success and intellectual satisfaction<sup>4</sup>. Although not classified as academic credit bank, research areas such as learning motivation of adults have much in common with the learning motivation of academic credit bank learners. For example, Houle<sup>5</sup> outlined three classifications of motivational orientation of adults as goal-oriented, activity-oriented, learning-oriented.

In the study by Boshier<sup>6</sup>, these were classified as improvement of relationship with others/escape, inner-directed advancement or other kinds of advancement, sharing with the society, pursuit of knowledge, egocentrism versus altruism, career-related advancement, and the joy of learning. Beder & Valentine<sup>7</sup> classified these as self-improvement, family support, diversion, cultural development, community/church

involvement, job acquisition, beginning of a new job, economic necessity, educational progress and recommendation from those around them. And also, many researchers studied the similar area such as MOOCs<sup>8</sup>, online credit bank learners satisfaction<sup>9</sup>, online education system for childhood teachers<sup>10</sup>, proliferation of e-learning in universities<sup>11</sup>.

As it can be seen in the aforementioned previous studies, it was found that the characteristics of the learners were provided for the most part by qualitative research at the level of frequency and factor analyses thereby indicating that meticulous research on academic credit bank learners were not being conducted.

### III. PROPOSED WORK

For the empirical analysis used in this study, the survey was conducted on academic credit bank students from University-affiliated lifelong distance education institution in Choongnam area over a period of two semesters from October, 2014 to March 2015 in which a total of 300 questionnaires were collected. Of the total, 241 questionnaires were used for the analysis due to the elimination of responses which contained numerous missing values.

The survey consisted of 43 measurement items for the factor analyses of learning motivation and demographical characteristics such as gender and age.

The questionnaire consisted of demographical characteristics and motivation to learn for factor analysis.

Each item for measuring learning motivation consisted of 5-point Likert scale.

The demographic characteristics of the sample are shown in Table 1.

Table 1: Demographic Characteristics of the Sample

Category		Frequency(%)	Category		Frequency (%)
Gender	Male	41(16.9)	Marital status	Married	169(69.5)
	Female	202(83.1)		Single	71(29.2)
Age	20's	50(20.6)		Occupation	Others
	30's	73(30)	Professional		42(17.3)
	40's	88(36.2)	Office worker		31(12.8)
	50's and over	32(13.2)	Production and technical worker		2(0.8)
Educational background	High school	93(38.3)	Serviceworker		16(6.6)
	Associate's	49(20.2)	Government and education		18(7.4)
	Bachelor's	89(36.6)	Retired and unemployed		10(4.1)
	Master's and above	12(4.9)	Self-employed		9(3.7)
Income	At least 2million won	36(14.8)	Housewives		69(28.4)
	2 ~ 3mil	51(21)	Others		22(9.1)
	3 ~ 4mil	51(21)			
	4 ~ 5mil	42(17.3)			
	over 5million won	63(26)			

Factor analysis was conducted using principal component analysis to analyze the learning motivation of the academic credit bank students (see Table 2). The analysis was conducted after eliminating factors which overlap or do not satisfy the factor loadings value of 0.5; as a result, learning motivations were categorized into seven factors. To reflect the characteristics of the measurement items, the categorized factors were designated "family happiness", "desire for learning", "others' recommendation", "professional development", "use of leisure time", "new challenges", and "admission to higher education institutions." The results of the analysis proved to possess reliability and validity with the explanatory power of the overall variance at 70.677%, with KMO coefficient of .883, and Bartlett sphericity test hypothesis  $\chi^2$  value of 5531.225 ( $p < 0.001$ ) having statistical significance. Among the 43 measurement items, 11 items were determined to neither satisfy the factor loadings value nor be appropriate for the configured factors. Thus these were eliminated: obtaining professional knowledge or technical skills, improving competence, discovery and development of one's potential, satisfaction of intellectual curiosity, meeting new people, changing occupation, earning more money, breaking from and revitalizing daily routine, and improving mental health.

Table 2: Factor Analysis and Reliability Analysis of Learning Motivations of Distance Academic Credit Bank Students

(N=243)

Factors	Measurement items	Factor loading	Dispersion ratio	Cronbach's $\alpha$	Eigen value
F1 <sup>a</sup> Family happiness	To be a better husband or wife	.857	30.921	.917	10.204
	for children's education	.846			
	To be better parents	.845			
	To be good role models for their children	.811			
	To take care of the family	.792			
	To meet the expectations of the family	.656			
	To help other people	.571			
F2 Desire for learning	Learning it now may help in the future	.757	13.364	.871	4.410
	To face the challenges of life through the acquisition of new knowledge	.712			
	To enjoy learning	.708			
	To try new things	.664			
	To adapt to reality through learning	.662			
	Insufficient education from previous schooling	.575			
	Personal desire to get ahead of others	.574			
	The subject one has always wanted to study has been offered	.555			
F3 Others' recommendation	Recommendation of family	.879	7.919	.870	2.613
	Recommendation of friends	.858			
	Recommendation of other people	.796			
	To feel a sense of belonging	.626			
	To overcome a difficult situation in the face of reality	.514			
F4 Professional development	To be more competent at work	.873	6.970	.910	2.300
	To obtain knowledge and skills necessary for work	.862			
	To improve career/occupation	.808			
	To obtain promotion at work	.722			
F5 Use of leisure time	To make better use of free time	.875	4.748	.875	1.567
	To enjoy leisure and hobbies	.863			
	Have sufficient leisure time	.775			
F6 New challenges	Not good at anything in particular	.738	3.604	.728	1.189
	Unemployed seeking a job	.630			
	Boredom with life	.627			
F7 Admission to higher education institutions	To enter graduate school	.737	3.151	.808	1.040
	To obtain a degree	.732			
	To transfer to another university	.714			
Overall variance explanation power: 70.677, KMO=.883 Bartlett sphericity test hypothesis $\chi^2= 5531.225(p<0.000)$					

a: Average value of Likert 5-point scale (1=strongly disagree, 3=average, 5=strongly agree)

Hierarchical cluster analysis was performed using the seven factor scores derived for the market segmentation of the learning motivation of the learners. After the calculation of the total average measure of each factor, Ward's method was used to determine the number of clusters. K-means clustering analysis was conducted based on the number of clusters; to reflect the characteristics of each cluster, cluster I was designated "pursuit of desire for learning and professional development" group; cluster II was designated

“pursuit of multipurpose group; and cluster III was designated “the pursuit of family happiness and desire for self-directed learning” group.

Table 3: Cluster Analysis and Post-Hoc Test of Learning Motivations of Distance Academic Credit Bank Students

(N=243)

Category	ClusterI(n=130)	ClusterII(n=28)	ClusterIII(n=85)	F-value (Significance Probability)	Scheffe multiple range tests		
					I - II	I - III	II - III
F1a Family happiness	3.63 M	4.16 H	3.17 L	21.688***	***	***	***
F2 Desire for learning	3.68 M	4.32 H	3.19 L	41.180***	***	***	***
F3 Others' recommendation	2.49 M	4.08 H	1.80 L	120.845***	***	***	***
F4 Professional development	3.44 M	4.29 H	2.34 L	95.043***	***	***	***
F5 Use of leisure time	3.13 M	3.86 H	2.59 L	25.260***	***	***	***
F6 New challenges	2.62 M	4.01 H	1.97 L	86.161***	***	***	***
F7 Admission to higher education institutions	3.13 M	4.08 H	1.85 L	125.253***	***	***	***
Cluster Type	Pursuit of desire for learning and professional development group	Pursuit of multipurpose group	Pursuit of family happiness and desire for self-learning group	Pillai's Trace=28.057(P<0.001) Wilks' Ramda=45.744(P<0.001) Hotelling-Lawley=68.426(P<0.001) Roy's Greatest Root=133.832(P<0.01)			

a: Average value is calculated using 5-point Likert scale (1=strongly disagree, 3=average, 5=strongly agree)

b: Difference between the average values is indicated according to significance from

H(high)>M(medium)>L(low)\*\*\* p<.001

Multivariate analysis of variance (MANOVA) was performed using the 7 factors of learning motivation derived through factor analysis in order to ensure the validity of the results of the cluster analysis. The result of the analysis determined that the Pillais' Trace, Wilks' Lamda, Hotelling-Lawley, Roy's Greatest Root values were all analyzed as statistically significant (p <0.001). These validation test results show that the cluster analysis results using the 7 factors of learning motivation is valid. Therefore, the learner group according to the learning motivation of lifelong distance academic credit bank has been subdivided into “pursuit of desire for learning and professional development” group, “pursuit of multipurpose” group, and “the pursuit of family happiness and self-directed learning” group.

Multinomial Logit model (MNL) model was applied to determine the effect of the learner variables on each cluster type according to the cluster types categorized according to the factors of learning motivation of the lifelong distance academic credit bank learners. The dependent variable is the cluster type (Note Table 3); the demographic characteristics variable which most easily explains the characteristics of the learners of academic credit bank was applied for the independent variable used in model estimation. Descriptive statistics of the variables were presented in Table 4; the model estimation results are shown in Table 5. Base variables which were determined to be important according to the characteristics of the independent variables were selected, and the dummy variables were assigned 1 to 0. For instance, in order to investigate whether there were differences between men and women in gender, men were assigned 1, while women were assigned zero. Age was applied as an independent variable to determine the differences according to age, the variables were categorized into 20's, 30's, 40's and 50's and treated as dummy variables; income, education, and occupation variables were also treated as base variables and dummy variables. As a result of applying the MNL model, in which the segmentalized cluster categories were selected as the dependent variables and demographic variables were selected as the independent variables, the variables that affect the cluster categories are shown in Table 5.

In order to interpret the results of the analysis, whether the t-value takes on a positive or a negative value was determined and the level of significance for each value was determined. Cluster I “pursuit of desire for

learning and professional development," had influential relationship with variables of educational background, age, occupation, and income. Those who hold bachelor's degrees (1% significance level) had negative influence while those who were in their 50's or older (10% significance level) were analyzed to take on negative relationship of influence. However, white collar (10% significance level) had positive influence, the income levels of 4 million-5 million won, and over 5 million won each had positive influence at 5% and 1% significance level.

Table 4: Definition of MNL Model and Descriptive Statistics

(N = 243)

Category	Variables	Variable parameter	Mean	Standard deviation
Dependent variables	Cluster	Cluster1~cluster3	0.765	0.641
Independent variables	Male	Male=1; female=0	0.168	0.375
	Marital Status	Married=1, others=0	0.695	0.461
	Educational Background	Associate's degree=1, others=0	0.201	0.402
		Bachelor's/master's=1, others=0	0.415	0.493
	Age	30's=1, others=0	0.300	0.459
		40's=1, others=0	0.362	0.481
		50's and over=1, others=0	0.131	0.338
	Occupation	White collar=1, others=0	0.172	0.378
		Blue collar=1, others=0	0.127	0.334
	Income	2~3million won=1, others=0	0.209	0.408
		3~4million won=1, others=0	0.209	0.408
4~5million won=1, others=0		0.172	0.378	
5million won or higher=1, others=0		0.265	0.439	

In Cluster II, educational background, age, level of income had influence on the "pursuit of multipurpose" group; in Cluster III, the variables of educational background and age were analyzed to be influential. Upon a more detailed examination, in Cluster I, the bachelor's degree group had negative influence at 1% significance level while those in the age group of 50's or older had negative influence at 10% significance level. At 10% significance level, white-collar occupation group had positive influence; the income groups of 4million-5 million won and over 5 million won each had 5% significance level and were determined to have positive influence at 10% significance level. In Cluster II, educational background, age, and income were analyzed to have statistical significance in relation to the pursuit of multipurpose. Among them, bachelor's degree group were in a negative effect relationship at 5% significance level, the 30's age group were analyzed to have negative influence at 10% significance level. Moreover, the income group of over 5million won was determined to have negative influence at 10% significance level. In Cluster III, educational background and age were determined to have statistically significant influence on the pursuits of family happiness and desire for self-learning. Bachelor's degree group had positive influence at 1% significance level, the age range of 40's and 50s each respectively had positive influence at 10% significance level.

Based on the results of these analyses, comprehensive evaluation of the variable which influences market segmentation can be described as follows. Variables which have positive influence on the pursuits of desire for learning and professional development pertain to high school graduates, those in the 20's age group, white collar occupation group, and income groups with 4 million-5 million won income, and 5 million won or higher income; bachelor's degree holders, age group of 50's and older were variables with negative influence. The reason for this is that, the variable estimated to be the dummy variable, for instance, in the case of educational background, associate's and bachelor's degree holders were selected as the base variables and high school graduates were treated as dummy variable 0; thus the analysis result in which the bachelor's degree holders have negative influence can be interpreted to mean that the variable used as the dummy variable has positive influence. In the same way, the variables which have positive influence on the pursuit of multipurpose group pertain to high school graduate group and the income group of less than 2 million won. Bachelor's degree holders, the 30's age, and 5 million or higher income groups are variables which have positive influence. Lastly, the variables which have positive influence on the pursuit of family happiness and the desire for self-learning are the bachelor's degree holders, 40's and 50's age groups.

Table 5: MNL Estimation Results According to Cluster Types

Variables	Cluster I (n=130)	Cluster II (n=28)	Cluster III (n=85)
	Pursuit of desire for learning and professional development	Pursuit of multipurpose	Pursuit of family happiness and desire for self-learning
	coef(t-value)	coef(t-value)	coef(t-value)
Male	0.063 (0.649)	-0.077 (-1.429)	0.013 (0.144)
Married	0.060 (0.570)	-0.041 (-0.890)	-0.019 (-0.183)
Associate's degree	-0.038 (-0.405)	-0.029 (-0.695)	0.067 (0.713)
Bachelor's degree	-0.224 (-2.839)***	-0.082 (-2.088)**	0.306 (3.992)***
30's	-0.140 (-1.128)	-0.105 (-1.951)*	0.246 (1.969)
40's	-0.182 (-1.379)	-0.039 (-0.697)	0.221 (1.678)*
50's and over	-0.247 (-1.679)*	-0.004 (-0.081)	0.252 (1.739)*
White collar	0.156 (1.674)*	-0.050 (-0.982)	-0.105 (-1.137)
Blue collar	-0.067 (-0.647)	-0.007 (-0.132)	0.075 (0.756)
2~3million won income	0.120 (0.985)	-0.003 (-0.063)	-0.117 (-0.970)
3~4million won income	0.114 (0.900)	0.031 (0.637)	-0.145 (-1.149)
4~5million won income	0.275 (2.061)**	-0.0901 (-1.357)	-0.185 (-1.401)
5million won or higher income	0.020 (0.178)*	-0.100 (-1.909)*	0.080 (0.720)
Constant	0.268 (2.338)	0.041 (0.910)	-0.309 (-2.698)
Log-likelihood function	-205.0431		
Model X2	52.12849(P<0.000)		
Observed value	243		

Note: \*, \*\*, \*\*\*, 10%, 5% and 1% each indicate significance levels respectively.

#### IV. CONCLUSION

The purpose of this study is to determine how the clusters are formed from the categorized factors and to determine how market (learner group) segmentation is brought about through the formation of clusters by the categorized factors using factor analysis of the learning motivations of lifelong distance academic credit bank learners. Furthermore, it was to analyze which variables of learners, that is, demographic characteristics, influence segmentalized distance academic credit bank market. For the analyses, data collected from the questionnaires were utilized in conducting factor analysis, cluster analysis, and multinomial logit analysis (MNL).

Learning motivations of online academic credit bank learners were categorized into family happiness, desire for self-learning, others' recommendations, professional development, use of leisure time, new challenges, and admission to higher education institutions thus it was easier to comprehend the learning motivations of the learners. As a result of using cluster analysis, learning motivations were categorized into "pursuit of desire for learning" group and "pursuit of professional development" group, "pursuit of multi-purposes" group, and "pursuit of family happiness" group, and "pursuit of desire of self-learning" group" thus three types of learning motivation clusters were ascertained.

Through the application of Multinomial logit model (MNL), variables of educational background, age, and occupation, and income were estimated to yield significant influence on market segmentation. However, these variables did not have any influence on variables of gender and marital status. Variables which had positive influence on the "pursuit of desire for self-learning and the pursuit of professional development"

were groups of high school graduates, 20's, white collar, 4 million-5 million won income, 5 million won or higher income; variables which had negative influence were bachelor's degree group, and 50's and older age group. Additionally, variables which had negative influence on "pursuit of multipurpose" group were high school graduate group and less than 2 million won income group while variables of bachelor's degree group, 30's age group, and 5million won and higher income group had negative influence. Lastly, the variables which had positive influence on "pursuit of family happiness and pursuit of desire for self-learning" were bachelor's degree group, 40's and 50's age groups.

It is pertinent for academic institutions whose focal point of marketing centers on learners to take into careful consideration the types and clusters of learning motivations and the variables which have influence on these clusters. Marketing strategies may become opportunistic factors in accordance with the significant variables and influential variables for potential learner demand. Demographic characteristics with different variables which influence cluster types are determined due to the differences in the learning motivations and espoused values. Thus, in order to effectively exercise consumer management, it is necessary for academic institutions to look for ways to deal with different learner demands and promote marketing strategies through effective methods. In other words, effective operation of lifelong distance academic credit bank system relies on locating and dealing with the differences between potential and actual consumers.

In this study, problem may arise from the fact that the selection of the lifelong distance academic credit bank institution was limited to a particular region. However, the characteristic of the lifelong distance academic credit bank system has to do with the fact that it is carried out online and that it is not only offered to learners in a particular region but is made available to all learners nationwide; therefore, the validity of the collected data does not carry such a problem. Nonetheless, survey conducted in more diverse institutions may fortify the collected data with greater reliability and validity.

Furthermore, although demographic characteristics variables were used as independent variables in this study, it is believed that the application of more diverse factor variables such as learners' psychological factors and lifestyle may bring forth a more improved results in future research.

In conclusion, in the same way in which academic credit bank system is categorized into distance and attendance-based systems, a comparative study of two kinds of academic credit bank system learners and their motivation types along with academic institutions' selection attributes which can actually be implemented in reality from marketing perspective may carry more meaning for further research.

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## Local Festival and Culture Contents

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### Abstract---

**Background/Objectives:** This research aims to inquire about local festival culture contents of France which are considered a successful case of cultural contents industry and will make a diagnosis regarding the applicability and concomitant problems in our country.

**Methods/Statistical analysis:** In addition, this study will inquire into current status of cultural contents industry of typical European countries by classifying cultural contents industry composed of culture contents fusion. It also reviews French local festival and culture contents, represented by Bordeaux wine Festival. This research analyses the structure of storytelling and the emotional factors as communication and experience tool of historical and cultural resources in terms of cultural semiotics.

**Findings:** The findings are as follows: First, it is about a strategy linked with historical and cultural resources as a package touristic product made of the tradition, history, cultural heritage, arts and winery experience. Second, it is about a storytelling strategy. The status of Bordeaux wine holds a splendid story originated in long historical background and benefits of nature. Third, it is about a strategy oriented to communication and experience. Fourth, it is about a strategy inducing fun and fantasy. A festival is a form of a play, and the play is the culture itself. This is a strategy allowing humans of free spirit who want to be separated from routine reality to feel imagination and fantasy in which they play together becoming one with nature. The revitalization of local festivals which allow the increment of one's most personal happiness index is estimated to have the most crucial values and significance.

**Improvements/Applications:** Finally, the cases of European local festivals are considered to be worth benchmarking in many different domains in the sense that they create new contents by making interesting stories adapted from the past history.

**Keywords---** Local Festival, Cultural Contents Industry, Wine Festival, Brand Strategy, Semiotic Analysis, Storytelling.

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## I. INTRODUCTION

The 6T is often referred to representation of a main force leading the 21st century, the up-and-coming industry of the future<sup>1</sup>. They are IT (Information Technology), BT (Bio Technology), NT (Nano Technology), ET (Environment Technology), ST (Space Technology) and finally CT (Culture Technology). In this context, Culture Technology, namely, Cultural Contents Industry has important significance as one of the up-and-coming "6T" industries of the future.

Cultural contents industry derived from Culture Technology is a combined form between cultural technology and cultural heritage. To this form, the image of entertainment and happiness search pursued by entertainment-oriented industry is added and it is expanding the range towards Entertainment industry and Happiness Industry. The definition and concept of entertainment vary according to each country due to the different vision of culture, but it derived from "to entertain" and it is a sort of fun-seeking play including not only joy but also the form of catharsis<sup>1</sup>.

The era of creative economy is arriving, in which imagination becomes contents and culture becomes national power. The world is moving from the third wave as the society of information technology towards the fourth wave as the era of culture, creativity and imagination. We have already passed through the society of information and knowledge, and currently we are living in the era of the society of dreams and Experience Economy in which emotions and stories are considered competitiveness.

The growth focused on manufacturing industry which used to sway the world economy has been evolving towards service industry and technology-dominant industry economy or economy based on information and knowledge. However, since the core source of competitiveness was changed into culture and creativity, the paradigm is going through transformation towards creativity and culture-predominant creative economy<sup>2</sup>. The following chapters will make a comparative analysis of local festival contents between France and Korea as a concrete case of cultural contents industry in order to inquire into the current status and problems.

## II. APPLICATION CASE OF CULTURAL LOCAL FESTIVAL CONTENTS IN FRANCE

### A. *Characteristics and Origin of Festivals of the Western Society*

The characteristics of festivals of the modern-day Western society can be divided into four domains as follows:

Firstly, they are characterized by religious nature. In the countries with strong marks of Catholic tradition, festivals with religious inclination are maintaining the tradition. Secondly, they represent historicity and enjoying nature. The festivals have changed while symbolizing landowners of immense wheat cultivation, right-wing party and conservatives and have been added to some other elements of tradition, folklore and history. Up to now, the Catholic propensity is considerably emphasized while entertainment nature is also mixed making the scale bigger and bigger. Thirdly, the festivals demonstrate harmony among local people and national identity. People can be refilled with new energy in their daily lives in terms of feeling of solidarity, cultural identity and pride. Fourthly, festivals serve as efficient tools of spectacle, entertainment and publicity and promotion of the local area.

The festivals of the Western society originate in Carnival and Lent. Carnival is considered as an antipode of Lent. Carnival is a feast of eating and drinking heartily for the last time before going into the abstinence period called Lent. Ordinary people express their repressed desire through Carnival, and after the feast, they maintain their lives again following the norms of the strict society. Carnival plays a role in providing enjoyment cycle and opportunity of sharing funny, lewd and obscene talks.

Carnival is held as the landmark of time, in which the most definite polarity exists between a landowner and serf, priest and vulgus, winter and spring and death and life. By analyzing poems in Wine of 'Flowers of Evil' - The Wine of chiffoniers, The Wine of the assassin, The Wine of the solitary, The Wine of lovers - it can be seen that the intoxication of wine differs according to the categories of people. Several effects of wine as consolation of the people, criminal means, like the pride to God, aspiration to the unknown paradise are associated with the main attributes of Dionysus<sup>3</sup>.

### **B. Application case of Bordeaux Wine Festival**

Grapes or wine are used not only as biological values, but also as an active material of festival based on special area, this way, they are rapidly emerging as a representation of cultural values of the local area. The significance of cultural symbolism from positive perspective represented by wine is diversified. Wine holds diverse and complex meanings such as Christ's blood, miracle, life-giving water, health, longevity, beauty, dignity, elegance, nobility, culture and romance. Since wine is concretely linked with a wide range of classes and lives, it is often used as a material to explain features of social class. In other words, apart from presenting its physical feature as an alcoholic beverage discovered for the first time in humanity, wine has maintained its breath by playing a role as a former of human culture and values, simultaneously as a medium of spreading them.

In accordance with the reflection of these international and social tendencies, the Bordeaux Wine Festival was born in Bordeaux, the world's largest wine production region. The reason why the Bordeaux Wine Festival was able to rise to fame as a form of festival can be explained by its differentiated useful planning of contents. In the first place, it is based on storytelling strategy adapting long-lasting historical background of wine as an interesting story. In the second place, it is based on a variety of programs of Bordeaux Wine Festival. The cultural values of wine that the Bordeaux Wine Festival intends to emphasize are not any longer within the cultural boundary of the past. Meeting the increased needs of leisure of tourism of modern-day people, varied experience programs and cultural understanding programs are composed. Also, diversified art genres such as music and arts are connected with wine. In other words, the connotative significance of wine of Bordeaux is enlarged and reproduced by way of adding contemporary cultural contents to the inherent historical facts of the region of Bordeaux. Stated in another way, hierarchical meaning which was inclined to religious and differentiated aspect represented by Bordeaux wine of the past arrives to expand in a more horizontal way and hold diversified cultural contents through interweaving modern taste, artistic popular appeal and leisure and tourism codes. The ultimate goal of the Bordeaux Wine Festival lies in boosting the sales volume of French wine and recovering the glory of the past time as high-class wine. However, the strategy used in the process of attaining the goal corresponds to cultural application and recreation of diverse local resources represented by Bordeaux and France in a broader sense<sup>4</sup>.

### **III. ANALYSIS OF THE FESTIVAL CONTENTS IN METHOD OF CULTURAL SEMIOTICS**

The planning of the local festival contents in method of cultural semiotics takes an important role in program of cultural contents studies. This is a process of cultural semiotics which aim is to make students get interested in the vision and orientation of the festival planning<sup>5</sup>. Recently Paris Semiotics scholars interested in research methodology utilize their structural analysis methodology of Levi Strauss to identify cultural contents. His myth analysis is worth to analyze the process of creation and destruction of cultural trends which are formed differently depending on cultures. In the myth analysis used in local festivals, it shows a tendency to pursue an edutainment value inherent in basic values of human, Homo Ludens that play. The fun and edutainment concept of the intrinsic value of education has been rapidly spreading along. Therefore, it is necessary to renew the function of the local festivals fit the trend changes in social and cultural rules<sup>6</sup>.

The meaning of cultural semiotics generation model is a useful analytical tool to set up the concept of contents that make up the local festivals.

- 1) First, the edutainment value which implies the education and the entertainment elements and the infotainment value which implies the information and entertainment factors are implied in deep structure for the participants to enjoy the festival.
- 2) The next step is the storytelling process due to the structure circle with narrative structure of the festival.
- 3) The last step, surface structure appears to actively participate in economic and marketing.

Meaning generative model of cultural semiotics shows logically that the festival is being created in the visual image and the narrative. Meaning generative model is useful to derive the values to be passed to consumers through a signification system and the festival. That means generation model is an efficient scheme to derive the concept of the festivals. The applied local festival can be shown in the following figure. (Figure1).

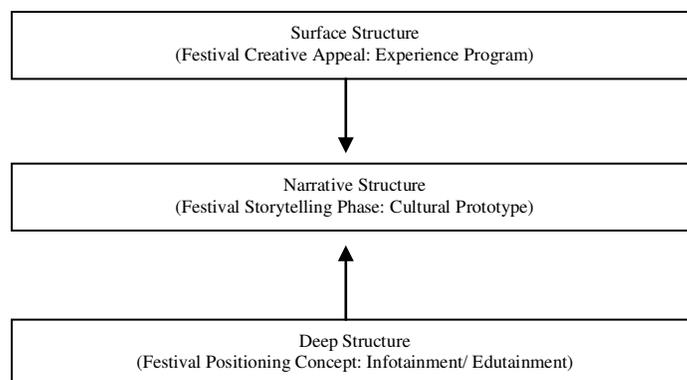


Figure 1: Generative Model of Signification for Local Festival

#### IV. LOCAL FESTIVAL CONTENTS OF KOREA AND THEIR PROBLEMS : ANALYSIS OF THE FESTIVAL CONTENTS IN METHOD OF CULTURAL SEMIOTICS

In front of Bordeaux Wine Festival of France, there is Wine Festival of Korea in Yeong Dong called Yeong Dong Grapes Festival. Most of Grape Festivals held in our country are designed to augment sales volume of grapes and they are not closely related with wine. It is because there are not many places with their unique brand names. However, Yeong Dong Grapes Festivals are held focusing on a production company with its own brand called Wine Korea located inside Yeong Dong County. This event is supported by the local government. This Festival is considered to remain in a marketing strategy level focused on the primary value of grapes as an agricultural product. Now it is urgently needed to expand its values as a festival of which cultural values of the grapes production area are equally combined. Currently, Yeong Dong Grapes Festival holds the position as a family-unit festival linking grapes with wine. However, considering a more enlarged applicability of wine festival contents, it will be required to reorganize the festival as a solid and stereoscopic festival program encompassing wine and the cultural endemism of Yeong Dong County<sup>7</sup>.

This study aims to inquire into the current status of local festival contents of our country as well as their concomitant problems, by looking into Yeong Dong Grapes Festival which can be compared closer, though relatively minor, with Bordeaux Wine Festival of France among many other local festivals of our country so far presenting. The significance and importance of local festivals in the local area based on the region is getting bigger and bigger, not to mention the increasing interest of tourists from another regions and countries. In particular, the influences of local festivals are getting greater day by day, since the local residents are considered as the protagonists of the event and the festivals contribute to strengthening solidarity based on spontaneity and community spirit and to promoting leisure and health of the local people<sup>8</sup>.

Since the local festivals started in earnest in Korea over a decade of errors and trials, it will be proper to say by now that the local festivals are taking root in the regions. If interesting program is added to the festival of local people, the event can start to attract attention of external visitors, this way; the festival can be an object of pride for the local people and an attractive cultural product for external tourists<sup>9</sup>. Finally, local festivals can change into a profitable product for regional revitalization, beyond the community identity of local people<sup>10</sup>.

It is important to establish a thorough strategy plan if the purpose is attracting as many as visitors possible and creating income of the region, by widely promoting the inherent image of the local area through making local festivals based on main materials such as unique specialty products or natural resources. The key point of the principled strategy lies in how this can be applied and employed in the separate areas in a proper way.

Firstly, it is about a strategy linked with historical and cultural resources. Bordeaux succeeded in attracting numerous tourists from all over the world, by promoting the festival through selling high-class wine from Bordeaux as a package touristic product made of the tradition, history, cultural heritage, arts and winery experience. Namely, they applied a strategy maximizing the added value of agricultural products by putting emphasis not only on the functional characteristics of agricultural products but also on the extensive cultural features of the region from which the products are.

Secondly, it is about a storytelling strategy<sup>11</sup>. The status of Bordeaux wine holds a splendid story originated in long historical background and benefits of nature. When the princess of Principality of Aquitaine, which is an ancient toponym of Bordeaux, gets married to the king of England, Aquitaine belongs to English royal family. Since then, Hundred Year's War broke out between England and France by the conflict of wine industry, and Joan of Arc and the French people restored Aquitaine. However, the English people, who dominated Aquitaine for about three centuries could not forget the flavor of wine from Bordeaux, this way, England turned into a main wine consumer of Bordeaux wine<sup>12</sup>.

Thirdly, it is about a strategy oriented to communication and experience. For instance, Rice Festival of Icheon emphasizing the solidarity of festival participants as well as Ginseng Festival of Geumsan allowing the memory of experiences bridging the gap between the participants and ginseng through digging out the ginseng roots from ginseng field in practice.

Fourthly, it is about a strategy inducing fun and fantasy. A festival is a form of a play, and the play is the culture itself. This is a strategy allowing humans of free spirit who want to be separated from routine reality to feel imagination and fantasy in which they play together becoming one with nature<sup>13</sup>. And the brand strategy of local festival is represented as follows. (Figure 2)

1st step :	Historical and cultural resources
	▼
2nd step :	Storytelling
	▼
3rd step :	Communication and Experience
	▼
4th step :	Fun and Fantasy

Figure 2: Brand Strategy of Festival Contents

## V. CONCLUSION

Until now, this study has classified cultural contents industry composed of culture contents fusion. In addition, this study inquired about Bordeaux Wine Festival among other local festival culture contents of France which is considered a successful case of cultural contents industry and made a diagnosis regarding the applicability and concomitant problems in Korea. The European local festivals are characterized by their preservation of historical cultural values of the local area without limiting them only within the cultural resources of the past. What is most important is making a unique interesting story of the region. The cases of European local festivals are considered to be worth benchmarking in many different domains in the sense that they create new contents by making interesting stories adapted from the past history, setting promotional marketing strategy combining the desire of modern-day people "leisure and tourism" and fusing the required technological elements.

Among the cultural contents industry serving as a driving force to shift from the third wave of information technology society to the fourth wave of the era of culture, creativity and imagination, the happiness of humans can be found from the festival, the authentic play. The revitalization of local festivals which allow the increment of one's most personal happiness index is estimated to have the most crucial values and significance.

Finally, the fun and edutainment concept of the basic value of education has been rapidly spreading along. Therefore, it is necessary to renew the function of the local festivals fit the trend changes in social and cultural rules. The meaning of cultural semiotics generation model is a useful analytical tool to set up the concept of contents that make up the local festivals.

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## Socioeconomic Impacts of Expansion of Non-Smoking Areas: A Systematic Review

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### Abstract---

**Background/Objectives:** Countries that ratified the World Health Organization Framework Convention on Tobacco Control (FCTC) have an obligation to protect people from exposure to tobacco smoke in all indoor places.

**Methods/Statistical analysis:** In order to identify the bases of economic or other impacts of the increased number of non-smoking zones, Whitlock's (2008) systematic literature review method was adopted. With the key question of "What kinds of changes can the designation and expansion of non-smoking areas make?" the review used Ovid-Medline and CENTRAL as databases for the literature search while utilizing DB pia, KoreaMed, Riss, NDSL, KISS for the domestic literature search.

**Findings:** The systematic literature review suggested that all businesses, except for bars, showed generally positive economic impacts resulting from expansion of non-smoking zones, though there were some discrepancies across different business types. These results were more distinct in studies funded by organizations unrelated to tobacco companies and those of high-quality research.

**Keywords---** Non-Smoking Area, Systematic Review, Economic Impacts, Healthy Impacts, Smoke-Free.

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## I. INTRODUCTION

Countries that ratified the World Health Organization Framework Convention on Tobacco Control (FCTC) have an obligation to protect people from exposure to tobacco smoke in all indoor places<sup>1</sup>. Article 8 of the FCTC states that exposure to tobacco smoke causes death, disease, and disability according to the unequivocally established scientific evidences. In addition, there is no safe level of indirect exposure to tobacco smoke because the carcinogens caused by tobacco smoke has no threshold<sup>2</sup>. According to recent data of the FCTC The tobacco-related deaths in Korea appear to account for 34.7% (49,704 people) in men and 7.2% (8,451 people) in women due to diseases related to smoking, among 26 million deaths due to all causes over 30 years by 2012. Currently in Korea, a non-smoking area is operating as specified for 26 kinds of facilities which are regulated by the National Health Promotion Act and as damage cases by exposure to environmental tobacco smoke increases due to indiscriminate smoking outdoors, the needs to expand non-smoking areas such as installation of outdoor smoking rooms in the future have been raised<sup>3</sup>. Such expansion of the non-smoking areas has been known to exert a direct impact on improving public health and to have a great outcome and impact in social and economic aspects, and the policy to regulate smoking in public places to reduce the harm of environmental tobacco smoke are gradually reinforced worldwide<sup>4</sup>. Also, further from expanding the range of public places and total banning of indoor smoking, it is a trend to regulate outdoor smoking at places adjacent to the non-smoking areas. Thus, many countries recognize the dangers of second-hand smoking and they restrict smoking in public places, however, in Korea, it is still possible to install the indoor smoking areas so that Korea has not reached completely to the smoke-free policies for public places. Recently, the state and local governments establish/ amend the National Health Promotion Act, the revision of the National Health Promotion Act and local ordinances to protect the public from the harm to be caused by second-hand smoke, however, in reality, it is not possible to perform assessments of exposure to second-hand smoking and the effectiveness of non-smoking area - related policies due to the absence of scientific evidences that can evaluate the effectiveness of the legislation.

Therefore, it is required to re-evaluate the effectiveness of existing non-smoking policy in long-term perspectives, and investigations should be conducted to determine the actual conditions of public facilities where exposure to second-hand smoking is severe so that findings from those investigations may provide the supporting data that is required for priority setting in a full scale promotion of the non-smoking area policies and for establishment of measures to expand the non-smoking areas in the future. In this study, it intends to conduct expeditious reviews of the existing literatures on the changes in such as restaurants according to the designation of the non-smoking area policy and to provide the evidences for relevant policy decisions.

## II. STUDY METHODS

In order to determine the evidences for the economic and other impacts of expanding non-smoking areas, the study performed a systematic literature review utilizing the existing Whitlock's (2008) systematic literature review method (2008).

### A. Key Questions

The key question of this study on the systematic review is "What kinds of impacts can the non-smoking area make before and after its designation and expansion?"

PICO-TS in accordance with the key question are as follows:

Population: The study is designed to be conducted in the entire population.

Intervention: Non-smoking area policy

Comparator: Comparison before and after implementation of the non-smoking area policy

Outcomes: Economic impacts, impacts on worker's health, and other social impacts.

Time: Unlimited

Study Type: systematic literature review and meta-analysis

### **B. Literature Search Database**

The literature search was conducted utilizing Ovid-Medline and Cochrane Central Register of Controlled Trials (CENTRAL) as databases for the foreign literature search (conducted on October 21, 2015). Search the foreign sources was conducted by using the modified terms based on the key words used in the search interfaces of Ovid-Medline, and by utilizing search tools including MeSH, text word, Logical operators, and Truncation without limiting the searching period. Search filters by the study type utilized the filter of SIGN.

In order to establish local bases in Korea, such as DBpia, KoreaMed, Riss, NDSL, KISS, National Assembly Library and KCI were utilized for the domestic literature search (conducted on October 23, 2015). Also a manipulative search for study reports was conducted utilizing the key words such as "systematic literature review", "meta-analysis", "smoking area" and "non-smoking area" from websites including ALIO, the Ministry of Health and Welfare, and the Korea Health Promotion Foundation to find the data from domestic reports.

### **C. Selection and Exclusion of Literatures**

The literature selection was performed independently by more than two reviewers (PHC, LJH, HJH, IBH, KKB) independent for all documents retrieved through searching. In the primary literature selection process, the literatures with topics irrelevant to this study were excluded, and in case of the literature selected by even one reviewer, all of them were selected. In the secondary literature selection process, the literatures with abstracts determined as irrelevant to this study were excluded and the literatures were selected according to the selection and exclusion criteria. In the tertiary literature selection process, the full-text of each literature was reviewed and the literatures corresponding to the literature selection criteria of this study were finally selected. If there was disagreement on selecting any literature, a consensus was acquired through a discussion with a third party (NJW).

### **D. Risk Assessment for Bias of the Literatures**

For risk assessment of bias, a quality assessment tool of systematic literature review, AMSTAR was utilized. AMSTAR as a quality assessment tool are mainly used by WHO or AHRQ, Canadian Optimal Medication Prescribing and Utilization Service (COMPUS) for a systematic literature review has been verified for its validity<sup>5</sup>.

For the quality assessment of a literature, two independent reviewers performed the assessment and they achieved consensus through the agreement on the discrepancies. The evaluation results were expressed as Yes (1), No (2), Cannot answer (3) and Not applicable (4). If answered 'Yes' to an item of AMSTAR, one point was given, otherwise zero point was given out of 11 points.

### **E. Data Extraction**

Data was retrieved utilizing a pre-determined data extraction format and it was reviewed and complemented by an independent reviewer. General characteristic data of the study for its design, environment, year of publication, and subjects and the data related to the pre-determined endpoints were collected as the key information. In principle, all main results related to designation of the non-smoking area described in the literature were to be retrieved.

## **III. RESULTS**

### **A. Literature Search and Selection**

A total of 3,398 foreign literature articles (2,748 articles from Ovid-medline, 650 articles from Cochrane) was retrieved. 386 articles duplicated and also 2,639 of 3,012 articles by reviewing the topics were excluded from the primary selection process. 346 of 373 literature articles remained were excluded from the secondary selection process by reviewing the abstracts. 6 literature articles of 27 literature articles remained were finally selected from the tertiary selection process by reviewing the full texts.

500 domestic literatures were reviewed after eliminating duplicated literatures out of 373 articles retrieved from DBpia, 17 articles from Korea Med, 102 articles from RISS, 19 articles from NDSL, 1 article from KISS, 4 articles from National Assembly Library and 0 article from KCI, and as the result, a total of 497 articles was excluded primarily. The full texts of 3 articles remained were obtained and they were reviewed together with 1 article additionally retrieved through a manipulative search for domestic study reports. From

this process, 1 literature article was finally selected, so that a total of 7 literature articles was selected for a systematic literature review. The literature selection process flow chart is as shown in the following figure 1.

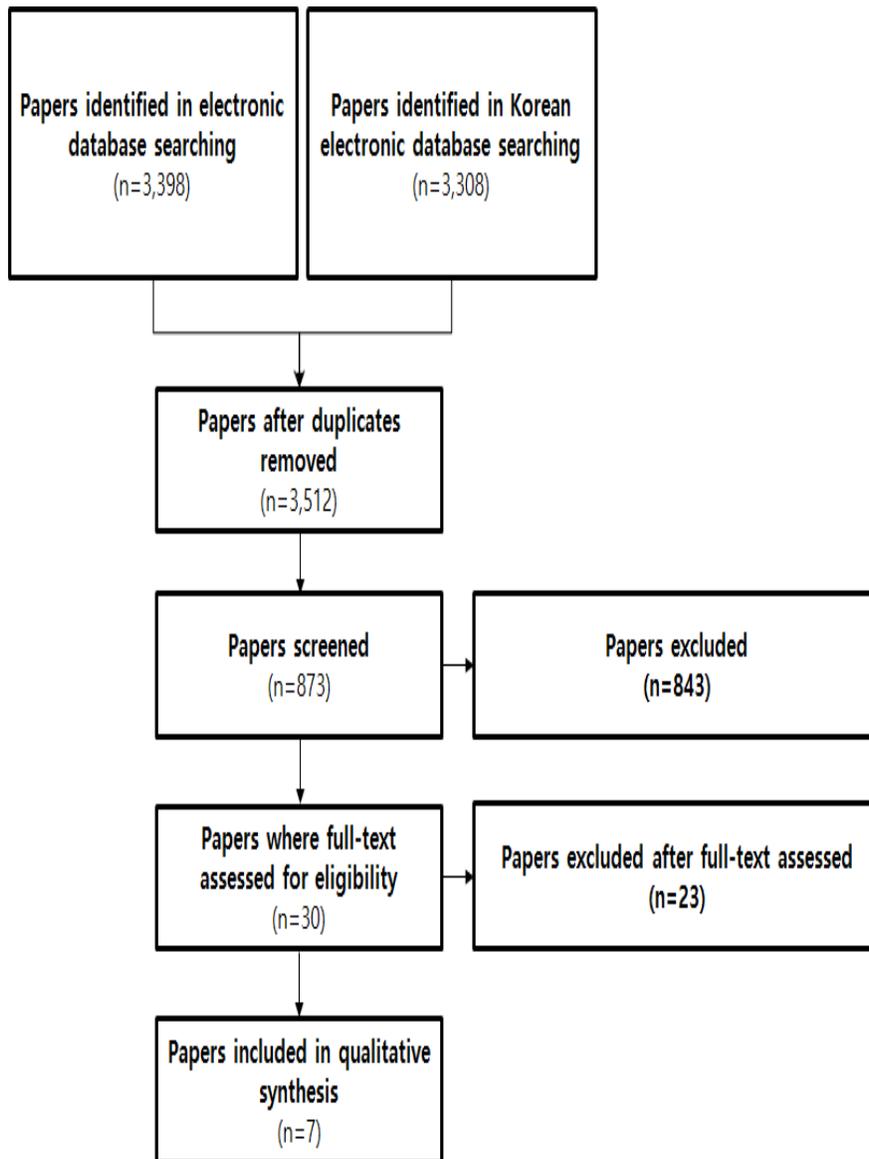


Figure 1: Literature Selection Process Flow Chart

### **B. Quality Assessment of Systematic Literature Review**

When assessed the quality of systematic literature reviews on 7 literature articles selected with AMSTAR, all literatures were selected through a comprehensive search, and 6 of them were used for the quality assessment of the study included and used the assessment results for formulating conclusion. In addition, as for the quality assessment score, 4 articles were found to be high-quality studies with 9-11 points, 2 articles were medium quality studies with 6~8 points, and 1 article was a low quality study with less than 5 points.

### **C. Results of Data Retrieval**

The systematic literature reviews on the finally selected 7 literature articles, were found to have differences in the search period, purposes of the studies, and search database as well as in the outcomes of the quality assessment on the literatures using AMSTAR as the tool (Table 1).

Table 1: Assessment on Impacts of Systematic Literature Reviews

Author	Number	Classification	Significant Outcomes	Conclusion
Cornelsen (2014)	56	Economic impacts		
		Sales	The decrease in sales of bars by 6.1% was affected by designation of non-smoking areas but it was irrelevant to the change in the sales of restaurants. When examined the change in total sales, restaurants and bars did not show any relevance with non-smoking policy, but when analyzed all cases of hospitality businesses in broader range, it showed relevance with increase of sales When conducted a meta-analysis only on the cases that the funding sources for research were reported and they were not associated with tobacco related industry, the sales increase by 2.7% was presented from all businesses.	The effect of non-smoking policy was different depending on the type of business, but the size of change was small in overall. In terms of economic change according to the non-smoking policy, some had benefited whereas others had disadvantaged from it, however, these economic losses had occurred at the initial stage of the policy implementation and disappeared over the time lapse
Employment	The non-smoking had shown an association with employment in restaurants but it had no relevance with the change of employment in bars and hospitality businesses in broader range. When conducted a meta-analysis only on the cases that the funding sources for research were reported and they were not associated with tobacco related industry, increase of employment by 1.4% was presented.			
Brown (2014)	46	Economic impacts		
		Economic inequalities	19 of 25 studies that had evaluated voluntary, regional and partial smoke-free policies, showed a high possibility to increase socio-economic inequalities in terms of protection from second-hand smoking. On the contrary, the comprehensive smoke-free policy at national level in the countries such as Australia, Canada, the United Kingdom and the United States showed reduction of inequalities in a range of policy by socio-economic status.	Implementation of voluntary or partial smoke-free policies at regional level showed a high possibility to increase socio-economic inequalities, but on the contrary, the comprehensive smoke-free policy at national level showed it could reduce socio-economic inequalities.
Sureda (2013) 11	4	Other social impacts		
		Exposure to second-hand smoking	A study examined the indoor and outdoor second-hand smoking, had confirmed the concentration of nicotine was significantly high in the partially enclosed outdoor smoking area and in the outdoor smoking area adjacent to the indoor, compared to other indoor non-smoking areas. It also showed the density of smokers and the distance to the smoking area were relevant.	Workers and customers of service providing businesses were reported as to be exposed to a high level of second-hand smoking under specific conditions and a discussion would be needed for whether the smoking-free policy should be established by expanding to the outdoor.
Wilson (2012)	31	Other social impacts		
		Smoking Behaviors (Smoking Rate and Non-smoking)	In a study examined the non-smoking policy at the regional level, it was confirmed that smoking was decreased after the designation of non-smoking area was implemented. It also confirmed the same results in the college students.  A study examined a comprehensive non-smoking policy performed at the national level had shown that there was a tendency of less dramatic change in the smoking rate.	It was confirmed that the non-smoking policy was effective to reduce the smoking rate in general public and at regional level (cities) than it was implemented at national level. However, if the range of non-smoking area gradually changes, it is expected to see the change in social norms and reduction of the smoking rate a few years later.
Callinan (2010)	50	Economic impacts		
		Customer	When reviewed the economic impact in 7 literatures, 3 of them showed that the customers before and after implementation of non-smoking policy did not significantly reduce, whereas 2 of them had reported that the number of customers did not change before and after implementation, but rather the influx of non-smoking customers increased	The number of customers to visit restaurants did not decrease after implementation of smoke-free policy, but rather the influx of non-smoking customers increased, and also did not appear to adversely affect the economics.
		Other social impacts		
		Exposure to second-hand smoking	There were 31 studies related to the exposure to second-hand smoking, and most of them showed a consistent evidence for the non-smoking policy to reduce the exposure to second-hand smoking at work places, restaurants, bars and in public places. It also presented the workers of hospitality businesses was showing a greater reduction in the exposure to second-hand smoking, compared to general population	The introduction of a smoke-free policy has led to a reduction in exposure to second-hand smoking, while the workers at hospitality businesses had shown a larger reduction in the exposure to second-hand smoking compared to general population.
Smoking	23 studies had reported on the measurements of smoking, and did not show any consistent evidence	The evidences related to the impacts of smoking were limited but showed a trend to decrease		

			for reduction of the smoking rate induced by the smoke-free policy, but the reduction of the smoking rate indicated decrease of a total tobacco consumption	
Scollo (2003) 12	97	Economic impacts		
		Main body of research	There is a tendency to form a conclusion that the studies supported with funding from tobacco related industry or performed by the institutions associated with such industry had adversely affect economically. However, among the studies not supported with funding from tobacco related industry, there was no study that had suggested adverse effects on the economics.	The high quality studies that had not supported with the funding from tobacco related industry, had presented that there was a positive impact or no impact at all on the sales of restaurants and bars where the smoke-free policy was implemented
Ahn (2011)	53	Impact on the worker's health		
		Respiratory Symptoms	10 literatures presented there were many studies reported on an improvement of respiratory symptoms such as cough and phlegm. Some studies reported on improvement of wheezing and breathing difficulty. But 3 studies that had distinguished whether the employee was smoking showed that there was no impact on the health of smoking workers	Non-smoking policy in restaurants and bars had the effect to improve employees' respiratory symptoms, lung function and other subjective/objective symptoms, but the effect was not shown if the employee was a smoker.
		Lung Function	4 studies reported the improvement of lung function, whereas 2 studies showed the improvement but with no statistical significance. 1 study that had distinguished the smoking status of the workers had shown that the policy had no effect in case of a smoker	
		Other impact on health	10 studies reported improvement in subjective symptoms such as Bloodshot, eye irritation, nose irritation, tonsillitis and throat irritation. But 3 studies that had distinguished the smoking status of the workers had shown no improvement of symptoms.	
		Other social impacts		
		Exposure to Second-hand smoking at work (workplace)	Most studies included had shown positive effect but when the nature of the non-smoking policy was partial, the size of the effect was small	A full-scale designation of the non-smoking areas had the effect of reducing the exposure to the second-hand smoking. Also, the designation of non-smoking areas did not directly impact on the reduction of smoking rate to a certain extent, but was assessed to have positive effect
Smoking Behaviors (Smoking Rate, Tobacco consumption and Non-smoking)	Although smoking rates have decreased in most studies, the decrease was not statistically significant			

**Economic Impacts by Expansion of Non-Smoking Areas**

The systematic literature review suggested that all businesses showed generally positive economic impacts resulting from expansion of non-smoking areas, though there were some discrepancies across different business types. These results were more distinct in studies funded by organizations unrelated to tobacco companies and those of high-quality research Cornelsen et al <sup>6</sup> reported the meta-analyses of 41 studies conducted in the United States and 56 studies in Germany, Ireland, Norway, Australia, Canada, South Africa, Argentina and Mexico had shown that the sales of bars had decreased by 6.1% after designation of non-smoking areas but it showed irrelevant to the change in the sales of restaurants, whereas the entire businesses had shown increase of sales by 2.7%. A study of Brown et al <sup>7</sup> showed the partial implementation of smoking-free policy by regional level was found to cause a high potential for socio-economic inequalities, but a comprehensive smoking-free policy legislation was shown to reduce socio-economic inequalities. In a study of Callinan et al <sup>8</sup>, the number of customers to visit restaurants did not decrease after implementation of smoke-free policy, but rather the influx of non-smoking customers increased, and also did not appear to adversely affect the economics.

**Impact on the Worker's Health**

There was one study that had examined the impact on the worker's health. The study of Ahn<sup>9</sup> reported that non-smoking in restaurants and bars had the effect to improve employees' respiratory symptoms, lung function and other subjective/objective symptoms, but in a study that distinguished whether the employees were smoking or not, the effect did not show on the employees who were smoking.

### **Other Social Impacts**

In terms of other social impacts, a study of Wilson et al <sup>10</sup> had confirmed the smoking rate was reduced after implementation of the non-smoking policy at the regional level, but a study examined a comprehensive non-smoking policy performed at the national level had shown that there was a tendency of less dramatic change in the smoking rate.

In a study of Callinan et al <sup>8</sup>, it had found that there were 31 studies related to the exposure to second-hand smoking, and most of them showed a consistent evidence for the non-smoking policy to reduce the exposure to second-hand smoking at work places, restaurants, bars and in public places. It also presented the workers of hospitality businesses was showing a greater reduction in the exposure to second-hand smoking, compared to general population.

### **IV. CONCLUSION**

The systematic literature review suggested that all businesses, except for bars, showed generally positive economic impacts resulting from expansion of non-smoking areas, though there were some discrepancies across different business types. These results were more distinct in studies funded by organizations unrelated to tobacco companies and those of high-quality research.

As for the impact of non-smoking policy on the worker's health, designation of the non-smoking area in restaurants and bars had the effect to improve employees' respiratory symptoms, lung function and other subjective/objective symptoms, but the effect was not shown if the employee was a smoker. As for the other social impacts, there was a consistent evidence for the non-smoking policy to reduce the exposure to second-hand smoking at work places, restaurants, bars and in public places. It also presented the workers of hospitality businesses was showing a greater reduction in the exposure to second-hand smoking, compared to general population.

This study had limitations as it could not search various databases of public health area as it had limited its search sources to the most important 2 search engine databases for the literatures subjected to a systematic literature review. To this end, it is considered that a further study should be conducted to identify diversified social impacts from expanding of the non-smoking areas in Korea.

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## Wearing Effectiveness of Bodysuit Pattern on Golden Body Proportion

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### Abstract---

**Background/Objectives:** Body-suit is a combination of brassier, waist nipper and girdle in terms of their functions to reshape and correct the whole body figure, and it emphasizes its fashion and function by using material with more flexibility and elasticity than the all-in-one which combines brassier, waist nipper and corset.

**Methods/Statistical analysis:** The wearing test is performed in the V company's sample-making workshop. The 3 subjects of the wearing test evaluated both new body-suit product and the existing product by wearing each of them and standing upright. Five professionals with expert knowledge on the clothing construction and the bodysuit are selected as inspectors for the wearing test. All data from this study are approved by using SPSS 20.0 with average, deviation and t-test.

**Findings:** The measurements reduced by wearing the body-suit are bust point distance by 3.5cm; outer diameter of breast by 3.3cm; inner diameter of breast by 3cm; waist circumference by 2.8cm; abdominal circumference by 2.3cm; under bust circumference by 1.5cm; and anterior neck point to bust point by 1.1cm. The increased measurements are hip circumference by 1.2cm; bust circumference 2.6cm; and below diameter of breast by 0.9cm.

In the Wearing Tests, eighteen out of total 21 questions show significant differences. In addition, the new body-suit is evaluated superior than the existing body-suit since the 3 questions on the side view (Q17~Q19) also showed the significant differences. The new product received the higher average score of 3.73 than that of the existing one with 3.18. In terms of the overall shape, the new product showed the significant differences in both questions with higher satisfaction in the enveloping the breast and the torso silhouette compared to the existing one.

**Improvements/Applications:** It is thought that these results will aid the body-suit companies to develop the body-suit products with superior wear-ability and functionality with increased efficiency in manufacturing the new products.

**Keywords---** Body-Suit, Brassier, Wearing Test, Waist Nipper, Corset.

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## I. INTRODUCTION

Body-suit is a combination of brassier, waist nipper and girdle in terms of their functions to reshape and correct the whole body figure, and it emphasizes its fashion and function by using material with more flexibility and elasticity than the all-in-one which combines brassier, waist nipper and corset.

The advance researches<sup>1-5</sup> reported that the complaints from the late middle aged women in wearing body-suits include the tightness around the chest and the bottom part being pulled upward, resulting in the short hours of constantly wearing a bodysuit in a day despite the previous experience.

Also the advance researches<sup>6-11</sup> complained the most about the size of the bodysuit, and the parts with complaint are, in a descending order, bodysuit length, crotch, hip, waist and bra-cup.

The basic measurement items for the foundation garments used by the industry are bust circumference, under bust circumference, waist circumference and hip circumference. However, the bodysuit developed by precedent studys<sup>12,13</sup> was designed with bodysuit length and Bra-cup as the additional measurement.

This study considers the bodysuit developed by precedent studys<sup>12,13</sup> as a new product and aims to compare and review its wearing effects to our existing product.

The new bodysuit is designed in order to improve the wearer's acceptability among the middle aged females by reexamining the industry's basic body measurements such as crotch, hip circumference, waist circumference and bra-cup as mentioned above.

## II. RESEARCH METHODS AND PROCEDURES

### A. Subjects and Measurements

The subjects are the middle aged women whose difference between her bust circumference and under bust circumference is 12.5cm. Three females in 80B size ( $92.5 \pm 2.5$ cm (90cm~95cm) of bust circumference and  $80 \pm 2.5$ cm (78.5cm~82.5cm) of under bust circumference) are selected for the study.

### B. Research Methods

Body posture for measurement is done by standing upright with wearing just a panty. KS K 9404:2009 (Korean Standards Sizing Systems for Foundation Garments, Korean Agency for Technology and Standards) sets the 3 basic body measurement items for bodysuit of under bust circumference, bust circumference and hip circumference; and the 4 reference measurements of height, crotch length, waist circumference, and trunk circumference.

This study used the instruments for Martin-Type anthropometry, measuring tape and weighing scale to measure 15 items such as bust circumference, under bust circumference, waist circumference, abdominal circumference, hip circumference, Bust Point-Bust Point, anterior neck point to bust point, below diameter of breast, inner diameter of breast, outer diameter of breast, A~B\* (distance from A to B [hip joint]: measured from the anterior part of body at the time of bodysuit pattern design and named as bodysuit length), waist-back length, waist length (under bust to waist line), hip length and vertical length of torso. The general items of body parts for the measurement are based on the physical standard of nation.

### C. Bodysuit Design & Items

Considering the bodysuit design and its functionality, the items for the pattern design of the new bodysuit product are set as ①full cup bra with wire insertion composed of 2 pieces of lower cup and 1 piece of upper cup; ②crotch vent; ③hip-up and volume effects of hips; ④power net of the abdominal and waist areas; ⑤armhole line and boat-neck round design of back neck line enveloping the back and axilla areas as much as possible to reshape the body figure; and ⑥bodysuit length which is added in the new product. In regards to the above 6 items, the new product is developed based on the study result from precedent study<sup>12,13</sup> by compensating the weaknesses of the existing products.

### D. Wearing Tests

The wearing test is performed in the V company's sample-making workshop. The 3 subjects of the wearing test evaluated both new bodysuit product and the existing product by wearing each of them and standing upright. Five professionals with expert knowledge on the clothing construction and the bodysuit are selected as inspectors for the wearing test. The checklist to evaluate the suitability of the new bodysuit product are divided into 23 questions for the inspectors and 18 questions for the wearers. The detailed

content of the evaluation is based on the advance research, and set by the final consultation with the foundation expert.

Each checklist is scored according to the five stage scaling:

- 1) very inappropriate
- 2) inappropriate
- 3) neutral
- 4) appropriate
- 5) very appropriate

**E. Data Processing and Analysis**

All data from this study are approved by using SPSS 20.0 with average, deviation and t-test.

**III. RESULTS AND DISCUSSION**

**A. The Constant Volume Comparison of Before and After Wearing the New Bodysuit Product**

The constant volume effect of the new bodysuit is examined by comparing the measurements of each part before and after wearing it, and the results are shown on Table 1. Comparison of the Body Size Changes Before and After Wearing the Bodysuit.

Table 1: Comparison of the Body Size Changes Before and After Wearing the Bodysuit.

Body Parts	nude value	new body-suit value	t-test
	Mean(SD)	Mean(SD)	
Bust Circumference	90.3(1.64)	92.9(1.20)	2.72*
Under-bust Circumference	82.2(1.35)	80.7(1.52)	-2.07*
Waist Circumference (WC)	75.7(1.40)	72.9(1.05)	-4.06**
Abdomen Circumference (AC)	85.5(1.23)	83.2(1.04)	-4.49***
Hip Circumference	92.4(0.94)	93.6(1.44)	13.42***
Bust Point-Bust Point (BB)	21.8(0.62)	18.3(0.36)	-14.49***
Neck Shoulder Point to Breast Point (NB)	27.5(0.41)	26.4(0.58)	-4.26***
Below Diameter of Breast	6.6(0.22)	7.5(0.00)	10.00***
Inner Diameter of Breast	12.0(0.82)	9.0(0.00)	-9.90***
Outer Diameter of Breast	14.3(0.61)	11.0(0.00)	-13.35***
Suit Length	33.5(0.87)	33.9(0.80)	1.13
Back Length	39.8(0.97)	39.6(0.87)	-0.56
Under-bust to Waist Line	12.7(1.31)	12.7(0.57)	0.89
Hip Length	21.7(0.43)	21.0(1.00)	-1.83*
Trunk Circumference	148.1(1.31)	148.7(1.52)	0.16

\*p<.05, \*\*p<.01, \*\*\*p<.001

In terms of changes in body measurement by wearing the new product, among the total 15 items of body measurements, except 4 items of body-suit length (the lowest point of breast outline to the hip joint), back length, waist length(under bust to waist line), and trunk circumference, the rest showed the results that require attention. Among the above 4 items, the distance from the lowest point of breast line to the hip joint is used as the bodysuit length on the bodysuit pattern design and the bodysuit is produced based on the actual measurement value without applying the ratio reduction by the elasticity. When the bodysuit length is shorter than the body length, it causes uncomfortable ness in the wearer due to the pressure on the hip joint as well as the crotch area being pulled upward. On the other hand, when the body-suit length is longer than the body length, the reshaping effect is diminished due to the formation of wrinkle on the waist area. Hence, in order to maximize the body reshaping effect by wearing a bodysuit, it is very important to set the body measurement for the body-suit length, that is, the distance from the lowest point of breast line to the hip joint point, appropriately. With this in consideration, it is suggested that setting 4 items of under bust circumference, bust circumference, hip circumference and body-suit length as the basic body measurements for the body-suit design can improve the reshaping effect of the body-suit in different body shapes. This is

according to the body-suit manufacturer's method. The bodysuit manufacturer sets the size of the hip area by the overall grading. For example, in case of a customer with small hips, the company provides the customer with the body-suit which compensates the small hips by grading the hip size into the average instead of fitting the hips. With this in consideration, to balance out the production and consumption, it is advised to set the body-suit length in S, M, and L sizes where M is the standard and the other sizes are set with  $\pm 3\text{cm}$  from it.

As shown on Table 1, the measurements reduced by wearing the body-suit are bust point distance by 3.5cm; outer diameter of breast by 3.3cm; inner diameter of breast by 3cm; waist circumference by 2.8cm; abdominal circumference by 2.3cm; under bust circumference by 1.5cm; and anterior neck point to bust point by 1.1cm. The increased measurements are hip circumference by 1.2cm; bust circumference 2.6cm; and below diameter of breast by 0.9cm. The increase in these areas are due to the body-suit supporting the body parts that can easily become loose and saggy. Particularly, the bust circumference is increased by average 2.6cm and the under bust circumference is reduced by 1.5cm by wearing the body-suit. These changes in body size by wearing the body-suit are interpreted as the results of that the study body-suit, produced in 80B size, successfully pushed in sagging breast and surrounding fat to the bra cups and pushed up the under bust areas to give volume to the breast. The bust point distance showed the biggest change and followed by outer diameter of breast, inner diameter of breast and bust circumference in a descending order. The results of the breast areas are interpreted that the bra cups of the body-suit are designed to reshape the breast into the most desirable form; and those of hip circumference and abdominal circumference are due to the 2-layered power net reducing the size in these areas. In other words, these changes in body size prove that the new body-suit product has improved the 4 areas except crotch vent among 5 areas (body-suit length, crotch vent, hips, waist, and bra cups) that the wearers had complaint as noted on the advanced research.

**B. Wearing Tests**

The newly developed body-suit is examined and compared with the existing basic body-suit in order to verify its design suitability and functionality. The observer conducted the sensory test on the front, side, rear and overall views with focus on the reshaping effects on the appearance, and the results are listed on Table 2.

Eighteen out of total 21 questions show significant differences. As shown on Table 2, the suitability of the study body-suit is over 3.5 in overall, but that of the basic body-suit for comparison is below 3.5 in overall and around 2.5 in the posterior aspects such as the roundness of the back, the posterior armhole and the unnecessary wrinkle on the posterior waist.

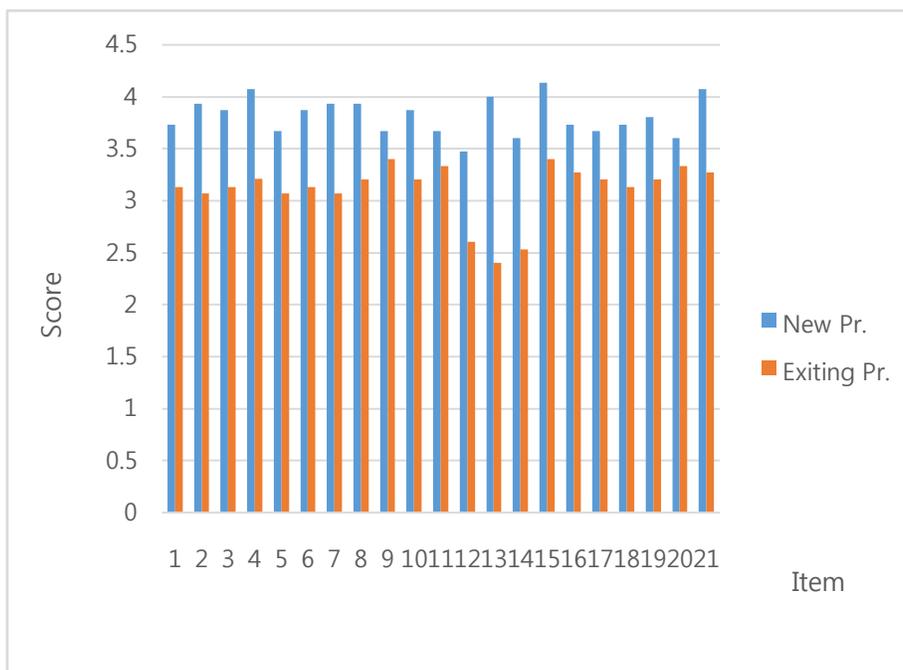


Figure 1: The Sensory Test by the Observer

Table 2: The Sensory Test by the Observer

No.	Items	New product	existing product	t-test
Q1	The tightness of the front center part is adequate.	3.73	3.13	3.37**
Q2	The position of cups is proper.	3.93	3.07	3.15**
Q3	The lower cup supports the breast well.	3.87	3.13	2.90**
Q4	It gives the adequate push to the breast towards the center.	4.07	3.21	3.21**
Q5	It beautifies the breast silhouette adequately.	3.67	3.07	3.02**
Q6	The roundness of the chest part is proper.	3.87	3.13	1.47
Q7	The breast line supported by the bra cups is satisfactory.	3.93	3.07	4.00***
Q8	The distance from the lowest point of breast to the hip joint is appropriate so that the body part of the bodysuit is neither pulled nor loose.	3.93	3.20	3.47**
Q9	There is no unnecessary wrinkles around the side lines of the waist and the fitness of the bodysuit around the area is appropriate.	3.67	3.40	1.47
Q10	The curved edges on the side legs are properly positioned.	3.87	3.20	3.38**
Q11	The silhouettes of the abdominal and waist parts area proper.*	3.67	3.33	1.87
Q12	The roundness of the back is adequate.	3.47	2.60	4.64***
Q13	The posterior armhole is adequate so that the fat is not pushed out.	4.00	2.40	8.41***
Q14	The posterior waist part is adequate without forming unnecessary wrinkles.	3.60	2.53	5.71***
Q15	It gives a good support to the hip.	4.13	3.40	4.60***
Q16	The hip part is adequate without forming unnecessary wrinkles.	3.73	3.27	2.41*
Q17	The sewing line on the side line is properly positioned.	3.67	3.20	2.82**
Q18	The silhouette from the side view is visually satisfactory.	3.73	3.13	4.03***
Q19	The roundness under the armpit is adequate.	3.80	3.20	3.33**
Q20	It envelopes the breast part generally well.	3.60	3.33	8.66***
Q21	The torso silhouette by wearing body-suit is satisfactory.*	4.07	3.27	4.13***

\*p<.05, \*\*p<.01, \*\*\*p<.001

Table 2 shows the high satisfaction with the new body-suit product because of the significant differences in 6 questions. These include, from the front view, in terms of the bra cups, the tightness of the front center part, the position of cups, the lower cups' support for the breast, the degree of the push effect, the breast silhouette and the satisfaction with the breast line. Q8 is the distance from the lowest point of breast to the hip joint and is evaluated very high with about 4 points. This proves the suitability of the body-suit length in the new product, and additionally, the significant difference is confirmed in Q10 the properly positioned curved edges on the side legs.

All five questions (Q12~Q16) regarding the posterior aspects prove the significance differences. The average score of the new product is 3.79, and that of the existing product is 2.84. The new body-suit product has received an excellent review on Q13 (the armhole is adequate so that the fat is not pushed out) and Q15 (it gives a good support to the hip) especially with over 4 points.

In addition, the new body-suit is evaluated superior than the existing body-suit since the 3 questions on the side view (Q17~Q19) also showed the significant differences. The new product received the higher average score of 3.73 than that of the existing one with 3.18.

In terms of the overall shape, the new product showed the significant differences in both questions with higher satisfaction in the enveloping the breast and the torso silhouette compared to the existing one.

The sensory test by the wearer is conducted in terms of the functionality and the aesthetic appearance, and the results are shown on Table 3. The new product showed a higher wear-ability with significant differences in all 10 questions of functionality. As shown on Fig.2, in terms of the functionality, the new body-suit is scored average 3.71 but the existing body-suit for comparison is scored average 2.19. Particularly, the new body-suit received the higher satisfaction with the complaint areas from the advanced research including the chest, under bust, waist and abdominal areas, hips, the position of crotch vent, the tightness of shoulder area and the body-suit length, and this indicates the enhanced functionality of the new body-suit compared to the existing one. The new body-suit also had significant differences in 5 out of 7 questions in the aesthetic appearance. It received an exceptionally higher average score of 3.91 in the breast silhouette, the roundness of the armpit, the curved edges on the side legs, the satisfaction with the bra cups and the trunk silhouette.

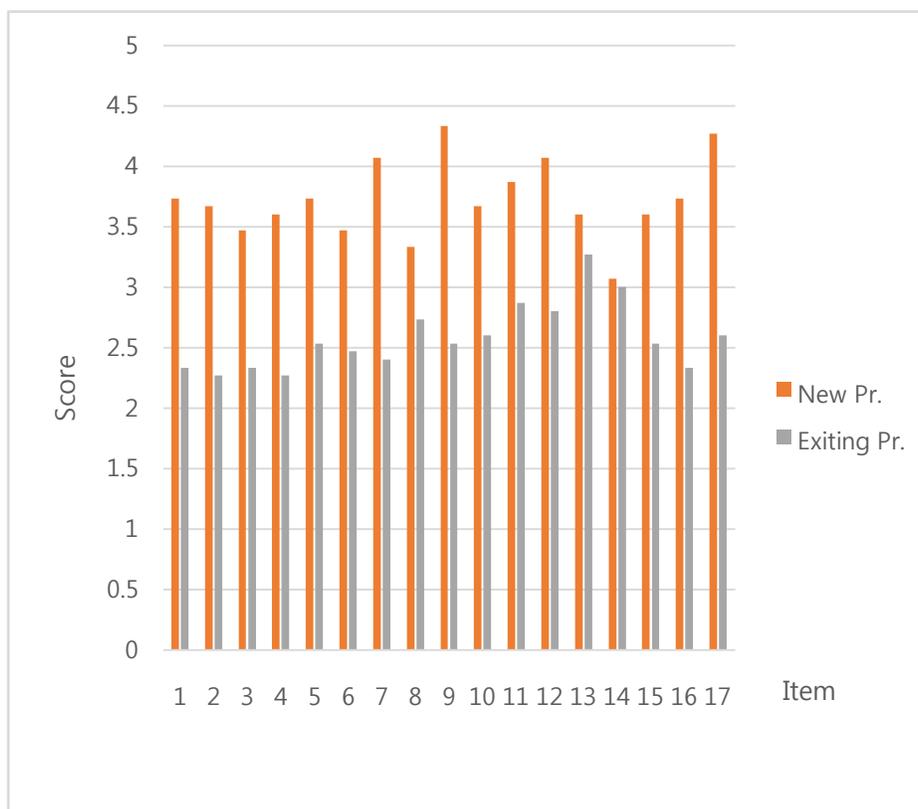


Figure 2: The Sensory Test by the Wearer

Table 3: The Sensory Test by the Wearer

Parts	No.	Items	New product	existing product	t-test
Functionality	Q1	The chest part is adequate without feeling tight or loose.	3.73	2.33	8.104***
	Q2	The bra cups give adequate support to the breast.	3.67	2.27	7.056***
	Q3	It pushes the breast towards the center adequately.	3.47	2.33	6.178***
	Q4	The tightness of the under bust area is adequate.	3.60	2.27	7.559***
	Q5	The tightness of the waist and abdominal areas is adequate.	3.73	2.53	6.735***
	Q6	It covers and supports hips adequately.	3.47	2.47	5.035***
	Q7	The position of the crotch is proper.	4.07	2.40	8.268***
	Q8	The tightness of shoulder area is adequate.	3.33	2.73	3.025**
	Q9	The bodysuit length is adequate.	4.33	2.53	8.663***
	Q10	The feeling of tightness after wearing the body-suit is suitable.	3.67	2.60	5.172***
Aesthetic appearance	Q11	The silhouette of trunk while wearing the bodysuit is satisfactory.*	3.87	2.87	3.949***
	Q12	It beautifies the breast outline.	4.07	2.80	5.452***
	Q13	The roundness of the chest is adequate.	3.60	3.27	1.654
	Q14	The roundness of the back is adequate.	3.07	3.00	0.269
	Q15	The roundness of the armpit is adequate.	3.60	2.53	5.708***
	Q16	The curved edges on the side legs are adequately positioned.	3.73	2.33	8.104***
	Q17	The breast line supported by the bra cups is satisfactory.	4.27	2.60	8.268***

\*\*\*p<.001

#### IV. CONCLUSION

The purpose of this study is to examine the excellence of the golden proportion body-suit, which is newly developed to improve the body reshaping effect in the middle aged females, by comparing and reviewing it to the existing body-suit in terms of the wearing effects.

- 1) The new body-suit developed for this study showed significant differences in 11 out of 15 body measurement items measured before and after wearing the body-suit. Among these 11 items with significant differences due to wearing the body-suit, 8 items are reduced in size and they are under bust circumference, waist circumference, abdominal circumference, bust point distance, anterior neck point to bust point, inner diameter of breast, outer diameter of breast, and vertical length of the hips. The other 3 items of bust circumference, hip circumference and below diameter of breast are increased in size by wearing the body-suit. These changes are the result of the reshaping effects on each part of the body from the new body-suit designed and developed based on the human body proportion. By wearing the new body-suit, bust circumference and hip circumference are increased by 2.6cm and 1.2cm respectively; under bust circumference and waist circumference are reduced by 1.5cm and 2.8cm respectively. There are no changes in 4 items of body-suit length (the lowest point of breast outline to the hip joint point), back length, waist length (under bust to waist line) and vertical length of torso, and in particular of the body-suit length, the wearing effect is improved with the body-suit whose pattern is designed based on the actual body size.
- 2) From the sensory test results of the new body-suit product and the existing product, the new product received the suitability score of over 3.5 from the observer, functionality score of overall average 3.71 from the wearer, and the position of crotch vent is evaluated excellent with score of 4.07. In addition, aesthetic appearance showed significant results in 5 out of 7 questions and the suitability is average 3.91 in regards to breast silhouette, the roundness of armpit, the position of curved edges on the side legs, the satisfaction with breast line supported by the bra cups, and the silhouette of trunk. Therefore, it is confirmed that the new body-suit product brings out the higher satisfaction with the areas such as crotch vent, hip circumference, waist circumference and the satisfaction with the bra cups which were the complaints noted from the advanced research.
- 3) It is thought that these results will aid the body-suit companies to develop the body-suit products with superior wear-ability and functionality with increased efficiency in manufacturing the new products.

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## Risk and Protective Factors of Disaster Related People

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### Abstract---

**Background/Objectives:** This study was carried out to examine mental health problems, and to investigate the risk factors as well as the protective factors that influence the occurrence of such problems.

**Methods/Statistical analysis:** Data for this study were collected from 111 people who suffered the Sewol ferry sinking disaster accident that occurred in South Korea in 2014. We performed a frequency and descriptive statistical analysis and T-test, ANOVA, Correlation analysis for univariate analysis that examine the association between independent variables and Inventory of Complicated Grief (ICG). Also we conducted stepwise multiple linear regression analysis to identify the association with ICG.

**Findings:** By stepwise multiple linear regression analysis, ICG Score were associated significantly with Post Traumatic Stress Disorder; PTSD( $p < .0001$ ), Experiences in Close Relationship; ECR( $p = 0.0494$ ), Insomnia Severity Index; ISI( $p = 0.0480$ ).

**Keywords---** Disaster, Inventory of Complicated Grief, ICG Score, Mental health, Psychiatry.

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## I. INTRODUCTION

Korea is continuously experiencing disasters such as the 1995 Sampoong department store collapse, the Seongsu bridge collapse, the 2003 Daegu subway fire, and the 2014 Sewol ferry sinking disaster. Due to such diverse ranges of disasters continuously happening including terrorism, natural disasters, man-made disasters, and contagious diseases, it is important to examine their factors depending on the characteristics of each disaster, and study them. There is a constant increase in study results that trauma caused by disasters not only raises the chance of mental disorders, but also raises the chance of chronic illnesses over the long-term such as musculoskeletal pain, high blood pressure, hyperlipidemia, obesity, cardiovascular diseases, and diabetes<sup>1,2</sup>.

Particularly, when victims experience multiple disasters in one area, their health worsens. The 2010 Gulf Oil Spill affected many areas that had already been damaged by Hurricane Katrina. In a study carried out on this area's victims, there was a result that more mental health problems occurred with more experiences of trauma and disasters. Also, the group that was most affected by the two disasters of the Gulf Oil Spill and Hurricane Katrina had the highest rate of PTSD symptoms. Moreover, there was a higher rate of symptoms for those of older age among children and youth, and women<sup>3</sup>. In Japan's case of the 2011 earthquake, tsunami, and the nuclear reactor disaster, children's daily lives became chaotic and they were distressed when they were banned from playing outside due to concerns of radiation<sup>4</sup>. The occurrence of such complex disasters is increasing, and it is critical to understand how factors that affect stress and instability influence the progress of disaster recovery.

The symptoms of grief cause mental impairment in daily activities, including performance in social and occupational roles. Such impairment include intense yearning, preoccupation with thoughts of the deceased family, crying, disbelief about the death, feeling stunned by the loss, and deficiency of acceptance of the death<sup>5</sup>. Complicated behaviors to grief occur when the death is violent or unexpected and when the bereaved and the deceased shared a close relationship, as in the loss of a family or friends. Therefore, bereavement-related complications can be viewed on a continuity of severity, from relatively mild and transient symptomatology to persistent problems in adjustment that qualify as complicated grief, a syndrome for which diagnostic criteria are being empirically validated<sup>6</sup>. The rationale behind the development of the ICG scale was to identify symptoms that could help to distinguish between griever and non-griever.

Psychological disorders are the most commonly occurs after traumatic events and disasters<sup>7</sup>. This study was carried out to confirm risk factors of mental health problems that associated with ICG and to investigate the protective factors that influence the occurrence of such problems arising in an individual, so that we can determine the long-term factors that affect the progress and the aftereffects of such problems, in order to establish a mental health support system for disaster victims.

## II. METHODS

### A. Study Population

The data used in this study were collected from 111 people who suffered the 2014 Sewol ferry disaster accident that occurred in South Korea. This data has the purpose to identify the risk and prognostics factors that have influence on mental health problems. The current study was carried out using data from 89 of the original 111 participants because we excluded missing data in dependent variables and participants who were younger than 20 years old.

### B. Instruments

#### *Inventory of Complicated Grief (ICG)*

The Inventory of Complicated Grief (ICG) is the tool developed to assess a symptoms of grief to predict functional mental disorders<sup>5</sup>. This instrument was designed to measure functional symptoms that have been termed complicated grief for their certain disaster. Participants are asked to report the frequency (Never=0 to Always=4) with which they currently experience such as behavioral, cognitive and emotional symptoms described in the ICG. It has a total of 19 questions and evaluated by summing all the scores. To inverse coded differently with original assessment method, the high score mean a positive result.

### ***Post-Traumatic Stress Disorder (PTSD)***

PTSD Checklist-5 is a PTSD self-report measure instrument that assess PTSD symptoms experienced over the past month according to the items<sup>8</sup>. Items assess the symptom across the 4 clusters of PTSD on the Likert scale (Never=0 to Extremely=4). It has 20 items and evaluated by summing all the scores. Also, to inverse coded differently with original assessment method, the high score is a positive condition from PTSD.

### ***Experiences in Close Relationship Scale-Short Form (ECR-S)***

Attachment was measured with the ECR-S. The ECR-S has 12 items and it is a ECR self-report measure tool. Participants used a Likert scale ranging from 1 point (strongly disagree) to 7 point (strongly agree). Point 4 is anchored by neutral. Original ECR-S has 36 items, and it should be included in the short form, which called the ECR-S-Short Form. Because this scale is also opposed to coding, the high score is a positive closer relationship with children.

### ***Insomnia Severity Index (ISI)***

This instrument consists of 7 items that evaluate the insomnia severity levels. Each of these items is rated on Likert scale (Not at all=0 to Extremely=4). The score range from 0 to 28, with original total high scores indicating greater insomnia severity, but in this study, to inverse coded differently with original assessment method, the high scores indicate less insomnia severity. It was classified into four groups: non-insomnia, mild, moderate, severe.

### ***Meaning in Life Questionnaire (MLQ)***

The Meaning in Life Questionnaire (MLQ) composed of two subscales, assessing the existence of meaning and search for meaning in life<sup>9</sup>. It has 5 items that rated from 1 to 7 (Absolutely true to Absolutely untrue). This instrument has not just demonstrated reliability and stability but also robust structural validity<sup>9</sup>. Total high scores indicate that it has the further meaning in life.

### ***Personal Feelings Questionnaire-2 (PFQ-2)***

The Personal Feelings Questionnaire-2 (PFQ-2) is a PFQ self-report measure instrument and it has 16 item adjective checklist. Each of these items is rated on Likert 4 point scale (Never experience the feeling=0 to experience the feeling continuously or almost continuously=4). It consists of 6 guilt items that mild guilt, remorse and regret and 10 shame items that embarrassment, feeling ridiculous and humiliated. The PFQ-2 adequate internal consistency, reliability, and construct validity<sup>10</sup>. Because this scale is opposed to coding in this study, the high score means a positive direction for personal feelings.

## ***C. Variables***

In this study, we included variables that affect the ICG score. We divided the variable categories based on four characteristics: demographic, socioeconomic, health-related, mental health. Demographic variables: sex, age, marital status, having children after disaster, type of family generation. Marital status was separated into two groups: married and other types of status (single, divorced, widowed). Having children after disaster means that alive children after disaster. Socioeconomic variables: unemployment after disaster, type of residence, type of medical insurance. Type of residence was classified into three groups: own house, rental housing, monthly rent and other types. Type of medical insurance was divided into National Health Insurance and Medical Aid. Health-related variables: neuropsychiatry, psychotherapy, counseling before disaster, family history of psychosis. Mental health variables: PTSD score, ECR-S score, ISI group (non-insomnia, mild, moderate, severe), MLQ score, PFQ-2 score.

## ***D. Statistical Analysis***

We performed a frequency analysis and a descriptive statistical analysis to calculate the frequency, percentile, mean and standard deviation of the variables. For univariate analysis, we used the statistical analysis such as T-test, ANOVA, Correlation analysis. Comparisons of characteristics between independent variables groups were carried out using t-test and ANOVA for differences in mean values of ICG score. Correlation analysis was used to analyze the relationship between continuous variables and ICG score. After controlling for confounding variables, a stepwise multiple linear regression analysis was conducted to identify the association with ICG. Stepwise regression is a model comparison procedure that identifies which independent variables have the strongest association with the dependent variable<sup>11</sup>. Statistical analysis was performed on the data using SAS version 9.4 (SAS Institute Inc., Cary, NC, USA).

### III. RESULTS

Table 1 shows the demographic, socioeconomic, health-related, mental health variables characteristics of study population and the univariate analysis result of ICG score. Characteristics of the participants were 42.7% male, 57.3% female and the average age was about 47. In terms of marital status, 24.14% were single, divorced, widowed group, 75.86% were married. Also 64.37% were having children after disaster. In terms of type of family generation, 10.85% were first generation, 79.52% were second generation, 9.64% were third generation. And 38.2% were lost their job after disaster. In terms of type of residence, 69.77% were own house, 17.44% were rental housing, 12.79% were monthly rent and other types. In type of medical insurance, 85.37% were in National Health Insurance. 21.35% of participants have an experience such as neuropsychiatry, psychotherapy, counseling before disaster. 12.36% of participants have family history of psychosis. In ISI groups, 21.59% were non-insomnia group, 39.77% were mild group, 25% were moderate group, 13.64% were severe group. The averages PTSD, ECR-S, MLQ, PFQ-2 score were 32.42, 66.43, 38.79, 34.26 respectively. In result of univariate analysis, PTSD score ( $p < .0001$ ), MLQ score ( $p = 0.0006$ ), PFQ-2 score ( $p < .0001$ ) were significantly associated with ICG score and ISI groups were showed significantly a difference ( $p < .0001$ ).

Table 1: Characteristics of Participants and Result of Univariate Analysis

Variable	N	%	Mean / R	SD	P-Value
Gender					0.4836
Male	38	42.7	25.71	14.83	
Female	51	57.3	23.43	15.33	
Age	89		46.71 / -0.07	7.47	0.5136
Marital status					0.9158
Single/Divorced/Widowed	21	24.14	24.62	14.98	
Married	66	75.86	24.21	14.98	
Having children after disaster					0.1355
No	31	35.63	27.61	14.83	
Yes	56	64.37	22.63	14.76	
Missing	2				
Type of family generation					0.3722
1	9	10.84	30.78	17.25	
2	66	79.52	23.17	15.16	
3	8	9.64	22.63	15.25	
Missing	6				
Unemployment after disaster					0.2691
Yes	34	38.2	22.15	13.91	
No	55	61.8	25.80	15.71	
Type of residence					0.8880
Own house	60	69.77	23.75	14.49	
Rental housing	15	17.44	25.87	16.47	
monthly rent, other types	11	12.79	23.82	17.33	
Missing	3				
Type of medical insurance					0.4951
Medical Aid	12	14.63	21.50	11.39	
National Health Insurance	70	85.37	24.77	15.81	
Missing	7				
Neuropsychiatry, Psychotherapy, Counseling before disaster					0.1424
Yes	19	21.35	19.89	12.94	
No	70	78.65	25.63	15.46	
Family history of psychosis					0.2290
Yes	11	12.36	29.55	18.64	
No	78	87.64	23.68	14.50	
PTSD score	89		32.42 / 0.78	18.16	<.0001
ECR-S score	86		66.43 / 0.04	7.85	0.7146
Missing	3				
ISI group					<.0001
Non-insomnia	19	21.59	38.68	14.99	
Mild	35	39.77	23.57	12.35	
Moderate	22	25	18.59	11.54	
Severe	12	13.64	15.75	14.53	
Missing	1				
MLQ score	89		38.79 / 0.35	14.06	0.0006
PFQ-2 score	88		34.26 / 0.49	14.54	<.0001
Missing	1				

R = Correlation Coefficient

Table 2 shows the result of stepwise multiple linear regression analysis. By stepwise multiple linear regression analysis, ICG score were associated significantly with PTSD score, ECR-S score, ISI group. ICG score was associated with increase in PTSD score ( $\beta=0.51$ ,  $p<.0001$ ), and decrease in ECR-S score ( $\beta=-0.27$ ,  $p=0.0494$ ). Also Non-insomnia in ISI group scored 5.65 points higher than the severe group ( $p=0.0480$ ).

Table 2: Result of Stepwise Multiple Linear Regression Analysis

Variable	Coef	S.E	P-Value
PTSD score	0.51	0.08	<.0001
ECR-S score	-0.27	0.14	0.0494
ISI group			
Non-insomnia	5.65	2.81	0.0480
Severe	Ref		
MLQ score	0.14	0.07	0.0519
PFQ-2 score	0.16	0.09	0.0817

Coef: Coefficient; S.E: Standard error,  $R^2=72\%$ ; Adj  $R^2=69\%$

#### IV. DISCUSSION

This study was carried out in order to examine the risk factors as well as the protective factors that affect disaster victims, and establish a mental health support system that supports disaster victims. The results of the study have shown that among disaster victims, ICG was associated with PTSD, ECR-S scores, ISI group. Those with a higher score of PTSD had higher grief evaluation scores. Those with lesser score of PTSD had better level of grief for losing their children. And those with a higher score of ECR-S had lower grief evaluation scores. Those with better attachment to their children had higher grief evaluation scores for losing their children due to the accident. In respect to the insomnia, the non-insomnia group had higher grief evaluation scores than the severe insomnia group, which indicated that the non-insomnia group had lower level of grief compared to the severe insomnia group.

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## The Effect of Mindfulness Meditation on Smoking High School Student's Smoking Cessation

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### Abstract---

**Background/Objectives:** The purpose of this study was to investigate the effects of mindfulness meditation program on smoking cessation, self-esteem and subjective happiness of high school students for smoking.

**Methods/Statistical analysis:** This study was conducted to five weeks from December 01, 2015 to January 10, 2016. The total of 40 Smoking High School Students participates. The experimental group is 20 smoking students from 'A' high school located in Gyeonggi Province. The control group is 20 smoking students from 'B' high school located in Gyeonggi Province. The data were analyzed using  $\chi^2$ -test, Fisher's exact test, t-test and ANOVA with SPSS 23.0 version program.

**Findings:** The experimental group was conducted for five weeks for a total of five sessions of 100 minutes per week mindfulness meditation interventions, the control group was carried out a total of five non-smoking education. The intervention effectiveness was tested for smoking cessation, self-esteem and subjective happiness. Results were compared with a control group that smoking willingness higher in the experimental group showed more reduction of daily smoking. And this was more self-esteem and subjective well-being higher in the experimental group compared with the control group. As a result, mindfulness meditation program was increased the willingness of non-smoking subjects with a reduction of daily smoking and it were increased the self-esteem and subjective happiness.

**Improvements/Applications:** Based on the results of this study will be applied to be considered a mindfulness meditation program to help smokers quit smoking by youth.

**Keywords---** Mindfulness, Meditation, Smoking Cessation, Self Esteem, Subjective Happiness.

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## I. INTRODUCTION

Recently, youth smoking rates are declining and due to cigarette smoking policy implementation, such as the cigarette price hike, the government has changed the goals of the 2020 youth smoking by 12% from 17.2%<sup>1</sup>. Although the smoking rate of young people is low, but, continued smoking in adolescence has a lot of psychological problems. Smoking cigarettes in adolescence consistently showed that the relationship between mental health problems such as depression and stress<sup>2</sup>. Smoking students was lower self-esteem than non-smoking students. In addition, stress also was higher<sup>3</sup>.

Therefore, we need a strategy to reduce stress, increase self-esteem in order to reduce youth smoking<sup>4</sup>. Emotion regulation strategies were found to be effective subject to high stress<sup>5</sup>. Mindfulness meditation has been reported to reduce stress and promote well-being as a way of regulating emotions<sup>6</sup>. In addition, it was found to help smokers to smoking cessation<sup>7,8</sup>.

Thus, the present study was to investigate the effects of mindfulness meditation intervention on the smoking cessation of high school smoking students. And we have been attempting to present the scientific basis for programs that help smokers quit smoking for students in schools that can.

Specific objectives of this study are as follows.

First, mindfulness meditation program identify the effects of smoking cessation for smoking high school students.

Second, mindfulness meditation program identify the effects of self-esteem for smoking high school students.

Third, mindfulness meditation program identify the effects of subjective happiness for smoking high school students.

## II. METHODOLOGY

### A. *Participants and Data Collection Methods*

The present study was to investigate the effects of mindfulness meditation program on smoking, self-esteem and subjective happiness of high school students who smoke. This study is nonequivalent control group pretest-posttest design.

Mindfulness meditation program used in this study was applied to the program used in the study of Kim<sup>6</sup>. The Mindfulness medication program was consisted of the following 5 subjects: Understanding of the mindfulness positive psychology, Become aware of one's body 1, Become aware of one's body 2, Become aware of one's body 3, Cultivate positive emotions 1 and Finish the Program.

Subjects were able to take advantage of the program  $G * Power 3.12$ . As a result, the calculated level of significance was  $\alpha = 0.05$ , effect size 0.50, 0.80 as the statistical power needed to 17 per group of 34 people.

The study involved 40 subjects smoking students in two high schools in Gyeonggi Province. The experimental group is 20 smoking students from 'A' high school located in Gyeonggi Province. The control group is 20 smoking students from 'B' high school located in Gyeonggi Province. The data were analyzed using  $\chi^2$ -test, Fisher's exact test, t-test and ANOVA with SPSS 23.0 version program.

This program was conducted from December 01, 2015 to January 10, 2016. The experimental group was subjected to 100 minutes of mindfulness meditation mediation session, a total of five programs a program once a week. In contrast, the control group was 100 minutes once a week for a total of five one was smoking cessation education. The design of this study is shown in Figure 1.

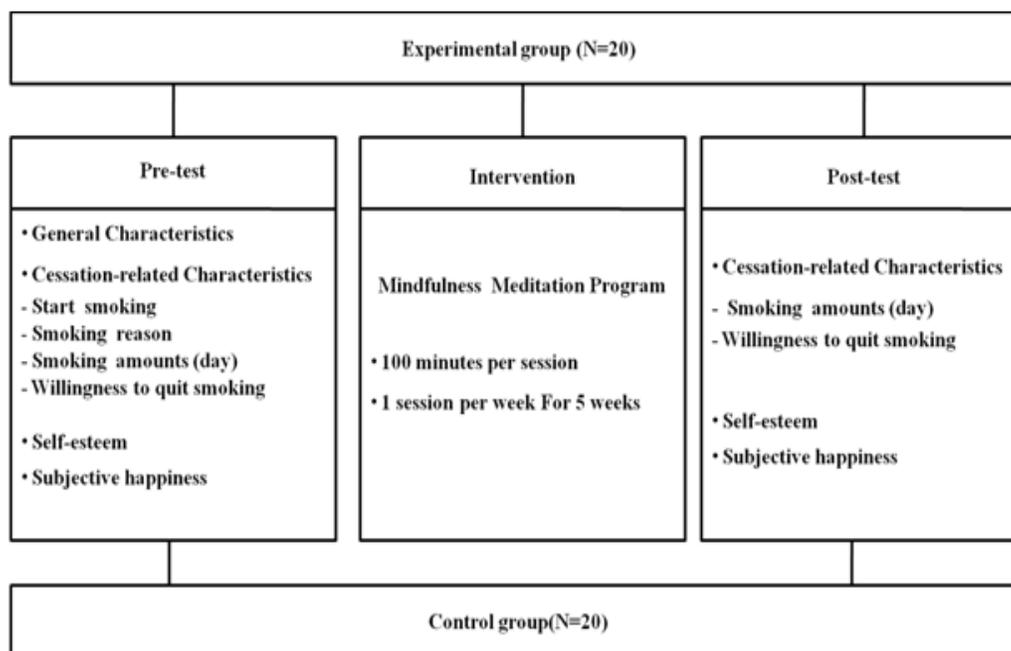


Figure 1: Design of the Study

## B. Instruments

### Characteristics of Study Subjects

Questionnaire on general characteristics and smoking-related characteristics were constructed through a consultative 5 people in department of nursing professor. The general characteristics of the subjects included age, gender, academic achievement, family economic status, family member, school counseling experience. Smoking-related characteristics were included in the information age started smoking, daily smoking, smoking reasons, willingness to quit smoking. One days smoking was treated as a high smoking the higher the score. It was treated with a question in the reverse direction. Willingness to smoking was estimated that the higher the score the higher smoking will. General characteristics and smoking-related characteristics were composed of 10 questions.

### Self-Esteem

We were using the self-esteem Rogenberg<sup>9</sup> tools are developed, it has been using the Jeon<sup>10</sup> translation tools. It is 3, 5, 8, 9, 10 questions were scored in reverse. Each item was measured by a four-point scale Likert Scale was composed of 10 questions. The higher the score the higher the item can be self - esteem. In this study, Cronbach's  $\alpha$  value was 0.89.

### Subjective Happiness

We were using subjective happiness Lyubomirsky et al<sup>11</sup> tools are developed, it has been using the kim<sup>12</sup> translation tools. Each item was measured by a four-point scale Likert Scale was composed of 4 questions. It is 4 questions were scored in reverse. The higher the score the higher the item can be subjective happiness. In this study, Cronbach's  $\alpha$  value was 0.93.

## C. Data Analysis

We used the SPSS (ver. 23.0) program. And we were compared by using the  $\chi^2$ -test, Fisher's exact test, t-test and ANOVA. Measuring tool used for the study using Cronbach's  $\alpha$  to the reliability.

- 1) General characteristics of the subjects, the homogeneity of the smoking-related characteristics and the dependent variable was verified by  $\chi^2$ -test, Fisher's exact test, t-test.
- 2) Smoking-related attributes in the experimental group and the control group, the difference between subjective well-being and self-esteem were analyzed by ANOVA.

### III. RESULT

#### A. Demographic Characteristics

Homogeneity results of the two groups, the general characteristics and smoking-related characteristics did not differ between experimental and control groups.

General characteristics of study subjects are shown in table I

Table1: General and Smoking Cessation-Related Characteristics of Subjects

Variables	Categories	Exp(n=20)	Cont(n=20)	X <sup>2</sup> or t	ρ
		Mean ± SD/N(%)			
Gender	Male	20(100)	20(100)		
Age		18.40±0.50	18.25±0.44	1.03	.311
Family	Parents+brothers	13(65)	15(75)	.54*	.909
	Parents	3(15)	2(10)		
	Grandparents	1(5)	1(5)		
	Single parents	3(15)	2(10)		
Economic condition	High	3(15)	6(14)	2.24*	.321
	Middle	17(85)	14(70)		
School grade	High	1(5)	4(20)	.42*	.519
	Middle	8(40)	8(40)		
	Low	11(55)	8(40)		
Experience of counselling	No	13(65)	11(55)	1.29	.321
	Yes	7(35)	9(45)		
Start smoking	Elementary school	3(15)	5(25)	.90*	.638
	Middle school	11(55)	11(55)		
	High school	6(30)	4(20)		
Smoking reason	Stress	13(65)	17(85)	.85*	.538
	Curiosity	6(30)	3(15)		
	Because a friend	1(5)	0		
Smoking amounts (day)	≥10	3(15)	0	4.71*	.095
	11-20	7(35)	8(40)		
	≤21	10(50)	12(60)		
Willingness to quit Smoking	No	9(45)	9(45)	2.53*	.282
	Within 6month	9(45)	4(20)		
	Within 1month	2(10)	7(35)		
	Right now	0			

Exp: experimental group, Cont: control group

\*: Fisher's exact test

#### B. Demographic Characteristics

Homogeneity results of the pre-variable in the two groups, the experimental and control group showed homogeneous.

Smoking one days in the case of the experimental group was changed to 2.45 points in the experiment after experiment before 1.40 points, the control group, there were differences in the scores between the two groups do not have a change of 2.25 points from 1.70 points before the experiment ( $\rho=.003$ ).

In the case of non-smoking willingness to experiment after experiment has been increased by 3.00 points from 1.65 points before the experiment, the control group increased by 2.05 points from 1.90 points before the experiment was the difference in scores between the two groups ( $\rho < .001$ ). Self-esteem was increased in the case of experimental groups before and after the experiment 32.10 points from 26.00 points to 29.85 points in the control group increased 25.80 points before the experiment was the difference in scores between the two groups ( $\rho < .001$ ). Subjective well-being was increased in the case of experimental groups before and after the experiment 24.60 points from 18.45 points to 20.78 points in the control group increased 19.75 points before the experiment was the difference in scores between the two groups ( $\rho < .001$ ).

Comparison of changes in cessation-related characteristics, self esteem and subjective happiness between groups are shown in table 2.

Table 2: Comparison of Changes in Cessation-Related Characteristics, Self Esteem and Subjective Happiness Between Groups

Variables	Group	Pre-test	Post-test	F	$\rho$
		M $\pm$ SD	M $\pm$ SD		
Smoking Amounts (day)	Exp	1.40 $\pm$ 0.50	2.45 $\pm$ 1.23	4.98	.003*
	Cont	1.70 $\pm$ 0.73	2.25 $\pm$ 1.20		
Willingness to quit Smoking	Exp	1.65 $\pm$ 0.67	3.00 $\pm$ 0.72	9.93	.000*
	Cont	1.90 $\pm$ 0.91	2.05 $\pm$ 0.99		
Self esteem	Exp	26.00 $\pm$ 1.83	32.10 $\pm$ 4.93	11.55	.000*
	Cont	25.80 $\pm$ 2.72	29.85 $\pm$ 5.49		
Subjective happiness	Exp	18.45 $\pm$ 1.84	24.60 $\pm$ 2.64	31.23	.000*
	Cont	19.75 $\pm$ 2.04	20.78 $\pm$ 3.12		

Exp: experimental group, Cont: control group

\* $\rho < .005$

#### IV. CONCLUSION

The present study was to investigate the effects of smoking, self-esteem and well-being of the students after conducting mindfulness meditation interventions targeting smoking students. The results of this study, a mindfulness meditation interventions targeting smoking has been shown to increase student self-esteem and subjective happiness than to conduct smoking cessation education.

Youth smoking is a psychological factors and environmental factors such as a person was found that with the combination of the action<sup>13</sup>. Student Smoking was found to lower the self-esteem by psychological factors as compared to non-smoking students<sup>14</sup>. Mindfulness meditation is to promote the psychological well-being and middle school students and high school students were reported to improve self-esteem<sup>15,16</sup>. These programs promote self-esteem was found to promote self-efficacy for smoking cessation, smoking reduces the amount of youth smoking<sup>17</sup>. Mindfulness meditation is the cognitive measures to enhance the positive emotion about the stress the stress relieving effect. And for young people under depression treatment improved the psychological symptoms to a positive emotion regulation<sup>18,19</sup>. These positive effects of mindfulness are adjusted to induce students' mental health in a positive way<sup>20</sup>. This increased happiness and self-esteem with positive effects of mindfulness students also participated in this study. It seems to have come to rely on changes in smoking and daily smoking.

Therefore, we need to develop a mindfulness meditation program for youth which can contribute to promoting self-esteem and happiness lead the youth smoking as a positive psychological state. This is also the practical application of the program is for students considering of quitting smoking in the education of the school.

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## Relationships between Emotional Style and Adaptability to College Life among Nursing Students

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### Abstract---

**Background/Objectives:** Human beings are able to create new types of emotions themselves. This study examined the relationship between emotional style and adaptability to college life among nursing students.

**Methods/Statistical analysis:** The participants in the present study were 644 nursing students from the D region. The study was conducted between March 23 and March 30, 2015; during this time, the content of the study was explained and questionnaires were completed. To examine the influence of participants' emotional style on adaptability to college life, linear regression analysis was used.

**Findings:** In six emotional styles among subjects, social intuition was the highest 7.13 (1.61), and attention was the lowest 5.47 (2.43). Nursing students' adaptability to college life was significantly correlated to resilience ( $r = .34, p < .01$ ), outlook ( $r = .28, p < .01$ ), self-awareness ( $r = .26, p < .01$ ), sensitivity to context ( $r = .22, p < .01$ ), and attention ( $r = .30, p < .01$ ). Resilience ( $\beta = .23, p = .000$ ), outlook ( $\beta = .15, p = .000$ ), attention ( $\beta = .18, p = .000$ ), self-awareness ( $\beta = .14, p = .000$ ), and sensitivity to context ( $\beta = .11, p = .004$ ), had a significant influence on adaptability to college life with an explanatory power of 22.6.

**Improvements/Applications:** The significant results of the present study provide basic data for the development of programs to support the adaptation to college life of nursing students.

**Keywords---** Emotional Style, Adaptability to College Life, Nursing Students, Resilience, Outlook.

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## I. INTRODUCTION

### *The Necessity for This Research*

Human beings face various internal and external changes at different moments in life, and such changes require adjusting to new experiences. Nursing is a practice dealing with the life of human beings, and nursing students have to adapt to vigorous schedules and cover curricula involving various major courses, including practical training courses, required to prepare for such important work. Furthermore, stress from studying and job searching often overlap during this period<sup>1</sup>. Moreover, the burden from clinical practice appears from the third year onwards. In light of such unique characteristics of this major, it can be concluded that success in adjusting to college life for nursing students is a highly critical starting point for growth in the nursing profession.

Previous study results have shown that self-efficacy, self-esteem, ego-resilience, emotional intelligence, satisfaction with major, stress-coping methods, character type, interpersonal relationships, and motivation to study have an influence on the adaptability of nursing students to college life<sup>2,3,4,5,6</sup>. In particular, in the medical field now a days, where the demands of patients continue to increase, nurses spend the most time directly with patients and carry arguably the greatest emotional burden among all medical service providers. In view of such occupational uniqueness, studies are being conducted in terms of emotional awareness and control among nursing students, who will be the nurses of the future<sup>7,8</sup>.

Davison<sup>9</sup> proposed that people show diverse emotional responses and confrontational abilities when they face particular problems in everyday living, and that emotional style involves individually consistent responses to experiences in life. Moreover, emotional characteristics increase the possibility that people will experience particular emotional states. Emotional style reflects brain characteristics and patterns and is an essential factor explaining human behaviors and emotions. Six emotional styles form a variety of combinations and determine personality and temperament. The brain can be changed by the mind, which has the power to alter the nervous system fundamentally in terms of the six dimensions of emotional style.

Even though research has investigated the role of emotional awareness and control in the relationship between successful adjustment to college life and emotion-related variables, no study to date has examined the emotional styles of nursing students and their relationship with adaptability to college life.

Emotional styles are newly made and created by individuals<sup>9</sup>. Emotion makes our lives meaningful and thus helps people to live with satisfaction in the world with others. In the present study, we aim to investigate nursing students' emotional styles and their relationship with adaptability to college life, and to use these as basic strategic data for promoting successful college life.

### *Purpose of this Study*

The purpose of this study was to identify the relationship between emotional style and adaptability to college life among nursing students, and the detailed objectives are as follows:

- 1) Identify the general characteristics of the participants.
- 2) Identify the correlation between the participants' emotional style and adaptability to college life.
- 3) Identify the influence of the emotional style of the participants on their adaptability to college life.

## II. STUDY METHOD

### *A. Study Design*

The present study was a descriptive correlation study designed to examine the relationship between emotional style and adaptability to college life among nursing students.

### *B. Participants*

The participants in the present study were 644 nursing students from the D region. The study was conducted between March 23 and March 30, 2015; during this time, the content of the study was explained and questionnaires were completed. The sample size was sufficiently large, as it was greater than the recommended number of 80 participants, calculated using G\*Power 3.1.9.2<sup>10</sup> to satisfy an effect size of .35, with a significance level of .05 and a power of .95 in linear multiple regression. Among the questionnaires collected from a total of 644 participants, those with unfaithful or missing responses on the main

measurement variables were excluded; thus, questionnaires from a total of 631 participants (97.9%) were used for the final analysis.

**C. Instruments**

Emotional style was measured using 60 questions from the checklist by Davidson, Begley, and Kwak <sup>9</sup>, while adaptability to college life was measured using the 67-item questionnaire based on the Student Adaptation to College Questionnaire (SACQ) by Baker and Siryk <sup>11</sup> translated by Huyn <sup>12</sup>. Subcategories of emotional style included resilience, outlook, social intuition, self-awareness, sensitivity to context, and attention; while adaptability to college life included the following four subscales: academic adjustment, social adjustment, personal-emotional adjustment, and attachment.

**D. Analysis**

The data collected in the present study were analyzed using SPSS 22.0.

- a. To analyze the relationship between the participants' emotional style and adaptability to college life, the Pearson's correlation coefficient was computed.
- b. To analyze the influence of the participants' emotional style on their adaptability to college life, linear regression analysis was used.

**III. STUDY RESULTS**

**A. General Characteristics of the Participants**

The general characteristics of the participants were as follows: 586 participants were under 25 years old (92.87%), 45 were over 26 years old (7.13%), and 568 were female (90.0%) (Table1).

Table 1: Demographic Characteristics

(N=631)

Characteristics	Categories	N	%	Mean(SD)
Age(year)	-25	586	92.87	21.65(4.107)
	26-30	26	4.12	
	31-	19	3.01	
Gender	Male	63	10.00	
	Female	568	90.00	
Grade	1st	177	28.05	
	2nd	235	37.24	
	3rd	219	34.70	
Religion	Protestant	224	35.50	
	Catholic	50	7.92	
	Buddhist	36	5.71	
	Etc.	4	0.63	
School grades	None	317	50.24	
	Very high	29	4.60	
	High	115	18.23	
	Medium	262	41.52	
	Low	167	26.47	
Satisfaction on major	Very low	58	9.19	6.34(1.908)
	Low			
	Medium			
	High			
	Very high			
Economic status	Very high	12	1.90	
	High	108	17.12	
	Medium	355	56.26	
	Low	103	16.32	
	Very low	53	8.40	
Factors of career decision	My will	387	61.33	
	Influence of patients	130	20.60	
	Influence of siblings or relatives	21	3.33	
	Influence of friends	12	1.90	
	Recommended by teacher	12	1.90	
	High employment rate	69	10.94	

**B. Emotional Style of the Participants**

Among the six emotional styles of participants, social intuition had the highest score with a mean value of 7.13 (SD = 1.61), and attention had the lowest with 5.47 (2.43) (Table 2).

Table 2: The Level of Emotional Style  
(N=631)

	M	SD	Range
Resilience	5.96	2.10	0.00~10.00
Outlook	7.00	1.68	1.00~10.00
Social intuition	7.13	1.61	2.00~10.00
Self-awareness	6.37	1.80	2.00~10.00
Sensitivity to context	6.96	1.50	1.00~10.00
Attention	5.47	2.43	0.00~10.00

**C. Adaptability of Participants to College Life**

The total score of adaptability to college life showed a range of 138.00 to 559.00, with a mean value of 335.90 (Table 3).

Table 3: The Level of Adaptability to College Life  
(N=631)

	M	SD	Range
Academic adjustment	101.21	17.20	43.00~180.00
Social adjustment	88.77	14.75	31.00~136.00
Emotional-personal adjustment	67.70	14.43	18.00~118.00
Attachment	89.78	18.26	32.00~143.00
Total adjustment	335.90	50.44	138.00~559.00

**D. Correlation Analysis**

Nursing students' adaptability to college life was significantly correlated with resilience ( $r = .34, p < .01$ ), attention ( $r = .30, p < .01$ ), outlook ( $r = .28, p < .01$ ), self-awareness ( $r = .26, p < .01$ ), and sensitivity to context ( $r = .22, p < .01$ )(Table 4).

Table 4: Correlations between Emotional Style and Adaptability to College Life

(N=631)

		Emotional Styles					
		Resilience	Outlook	Social Intuition	Self-Awareness	Sensitivity to Context	Attention
Adaptability to college life	Academic adjustment	.19**	.17**	-.01	.18**	.05	.26**
	Social adjustment	.30**	.29**	.09*	.22**	.29**	.23**
	Emotional-personal adjustment	.34**	.20**	.05	.21**	.14**	.29**
	Attachment	.27**	.26**	.08*	.22**	.26**	.19**
Total score(adaptability to college life)		.34**	.28**	.06	.26**	.22**	.30**

\* $p < 0.05$ , \*\* $p < 0.01$

**E. Regression Analysis**

In order to identify the explanatory power of the factors related to adaptability to college life, a linear regression analysis was conducted with adaptability to college life as the independent variable and resilience, outlook, social intuition, self-awareness, sensitivity to context, and attention as the dependent variables. Resilience ( $\beta = .23, p = .000$ ), outlook ( $\beta = .15, p = .000$ ), attention ( $\beta = .18, p = .000$ ), self-awareness ( $\beta = .14, p = .000$ ), sensitivity to context ( $\beta = .14, p = .000$ ), and social intuition ( $\beta = .09, p = .000$ ).

= .000), and sensitivity to context ( $\beta = .11$ ,  $p = .004$ ) had a significant influence on adaptability to college life with an explanatory power of 22.6 % (Table 5).

Table 5: Predictors of Adaptability to College Life

(N = 631)				
Variables	$\beta$	$p$	Adj.R <sup>2</sup>	F(p)
Resilience	0.23	0.000	0.226	8.310(0.004)
Attention	0.18	0.000		
Outlook	0.15	0.000		
Self-awareness	0.14	0.000		
Sensitivity to context	0.11	0.004		

#### IV. DISCUSSION

This study was conducted to confirm whether emotional style influences the adaptability to college life among nursing students.

Resilience, which indicates how quickly nursing students recover from difficulties, showed the highest correlation ( $r = .34$ ,  $p < .01$ ) with adaptability to college life; followed by attention, which indicates how accurately and clearly the students adjust the focus of consciousness ( $r = .30$ ,  $p < .01$ ); outlook, which shows how long they can maintain their positive emotions ( $r = .28$ ,  $p < .01$ ); self-awareness, which refers to how much they can understand their emotions shown physically ( $r = .26$ ,  $p < .01$ ); and sensitivity to context, which represents how well they can control their emotional responses considering the context of the society where they belong ( $r = .22$ ,  $p < .01$ ). Although it was difficult to find studies that had investigated the correlations between emotional style and adaptability to college life, our findings correspond with those of other studies reporting an association between emotion and adaptability to college life<sup>1,2,5,13,14</sup>. In a study by Kwag<sup>14</sup> conducted on 431 nursing students, ego-resilience was found to be associated with adaptability to college life ( $r = .53$ ,  $p < .01$ ). Furthermore, in a study by Moon, Kwon, and Chung<sup>15</sup> conducted on 185 nursing students, academic resilience ( $r = .72$ ,  $p < .01$ ) was correlated with adaptability to college life, which coincides with the results of this study where we observed the strongest correlation between the resilience type and adaptability to college life. In a study by Kim and Seo<sup>16</sup> conducted on 256 nursing students, psychological well-being was associated with adaptability to college life ( $r = .54$ ,  $p = .001$ ); this corresponds with the finding in the present study that the outlook type, possessing an ability to maintain positive emotion for a long time, was related to adaptability to college life. A study by Noh and Bae<sup>17</sup> conducted on 266 nursing students confirmed the relationship between the sub-factors of an emotion intelligence scale and adaptability to college life, and the correlation between self-awareness of emotion and adaptability to college life ( $r = .20$ ,  $p < .01$ ) is consistent with that between the self-awareness type and adaptability to college life found in this study. Furthermore, the use of emotions, that is, an ability to organize and apply emotional information to solve problems and to constructive activities for personal achievement, is associated with adaptability to college life ( $r = .50$ ,  $p < .01$ ), which is aligned with the finding that the attention type is related to adaptability to college life in the present study. In a study by Park<sup>5</sup> conducted on 104 nursing students, it was shown that emotional control, an ability to manage and control one's emotions, is related to adaptability to college life ( $r = .23$ ,  $p < .05$ ), which is consistent with the finding that the sensitivity to context type was correlated with adaptability to college life in the present study. Therefore, we could confirm that most emotional styles correlate with adaptability to college life. However, additional studies to confirm the correlation between emotional styles and adaptability to college life should be conducted in order to investigate which specific emotional styles can promote nursing students' adaptability to college life.

This study demonstrated that if resilience, self-awareness, sensitivity to context, and attention are prominent among nursing students, they positively affect adaptability to college life; especially resilience in terms of the ability to recover rapidly from adversity has been found to be important. Emotional style is not inherent in the human brain but is rather a plastic feature; thus, emotional style can vary<sup>9</sup>. Accordingly, the college experience can influence this variation by providing a personalized environment for the development of the emotional style of individual students. Furthermore, professors can teach students to conform to the direction in which the genetic types of specific emotion are expressed.

## V. CONCLUSION

The significant results of the present study provide basic data for the development of programs to support the adaptation to college life for nursing students. In addition, further research is needed that examines the relationship among various emotional variables affecting adaptability to college life among nursing students.

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## Influence of Coping Strategies in Depression of Korean Nursing Students

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### Abstract---

**Background/Objectives:** Coping with stress is considered a key mechanism mediating stress events and adaptation. The aim of this study was to ascertain associations between depression and stress coping strategies in Korean nursing students. This study is a cross-sectional survey conducted to identify stress coping strategies and examine the factors that affect the depression of Korean nursing students.

**Methods/Statistical analysis:** This cross-sectional study used two reliable survey questionnaires that measure depression and stress coping strategies. Data were collected from 180 nursing students in metropolitan cities in Korea, analyzing depression, and self-esteem with structured questionnaires. Scales of Beck's depression, Rosenberg's self-esteem, perceived stress, and Chambers' verbal anger behaviors were used. The correlation between variables was verified using the Pearson's correlation coefficients, and a multiple linear regression of the SPSS/PASW 22.0 program.

**Findings:** The depression of nursing students showed significantly negative correlations to social support seeking and problem-solving among stress coping strategies, and a significantly positive correlations to avoidance strategy ( $p < .01$ ). And the direct influence where types of coping with stress explained depression in nursing students was 20.3%

**Improvements/Applications:** The results of this study suggest that stress coping strategies can be potential risk factors for depression in the nursing students. Based on this study, a program to promote stress coping strategies in order to prevent depression of nursing students is suggested.

**Keywords---** Stress Coping Strategy, Depression, Nursing Student.

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## **I. INTRODUCTION**

Stress is increasingly becoming a part of our daily lives. Stress is best described as a situation where environmental demands exceed the capacity for effective response by the individual and can potentially have physical and psychological consequences. Coping with stress, on the other hand, is important for human survival and can be defined as the process of managing external or internal demands that are perceived as taxing on personal capacities and resources. Globally, the incidences of stress and stress-related illnesses such as anxiety and depression among students, trainees, and qualified physicians have increased and received significant attention in literature graduation<sup>1-3</sup>.

Coping with stress is considered a key mechanism mediating stress events and adaptation through all cognitive and behavioral effort to deal with internal and external demands evaluated to threaten personal handling capacity. In the process of coping with stress, according to personal and situational factors, values of a certain culture and normative factors, types of origins of stress and social resources that can be utilized when taking actual coping behaviors can differ. In addition, selection of awareness of stress situations and coping strategies can be different according to situational factors and values and normative factors of a certain culture.

Lazarus & Folkman<sup>4</sup> claimed that while stress can be an actual psychological factor that threatens the well-being of humans, coping methods rather than the stress itself had more influence on the well-being and adaptation of individuals. Because types of coping methods for stress situations are continuously changing cognitive and behavioral efforts to manage internal and external demands evaluated to exceed personal resources<sup>4</sup>, according to certain coping strategies problematic behavior can be used but on the other hand it can act as a protective factor that can lower the possibility of problematic behavior.

In actuality, physical response due to stress can influence mental illnesses and because mental illnesses can conversely threaten physical health, methods of controlling and coping with stress are very important. Especially, depressive disorders are important diseases that threaten the quality of healthy life and it is a very common psychological disorder as well as a very deadly disorder.

Looking at the studies related to stress coping methods and depression, it is as follows. Vitaliano<sup>5</sup> found that in people between 27 and 75 with family problems, occupational problems, and physical problems, divided into normal group and psychosis group, problem-based coping lowered levels of depression and emotion-based coping heightened depression. Park<sup>6</sup> reported about dysfunctional attitudes and university students and he found that use of active coping and emotion centered coping had moderating effect of decreasing depression. Kim<sup>7</sup> reported moderating effect of levels of depression and anxiety when using problem-based coping method and increase of depression in passive coping where stress situations are thought as destined to happen. On the other hand, Choi<sup>8</sup> reported about stress coping methods and depression in nursing students in Korea that where active coping methods on stress had no relation to depression, passive coping methods had a weak positive correlation.

As above, previous studies are not able to provide a decisive conclusion on the relation between coping methods and depression. Furthermore, to understand the influence of stress coping methods on the depression and university students, there is absolute lack of research data.

Therefore, there is need for detailed analysis and confirmation of influence of subtypes of stress coping methods on depression in university students. The complex stress and conflict, as well as the problem-solving process that they experience take up a large part of the adjustment to university life. This period in their lives also become a preparation for successful life post-graduation.

As such, the aim of this study was to ascertain associations between depression and stress coping strategies in Korean nursing students.

## **II. MATERIALS AND METHODS**

### **A. Study Design**

This study is a cross-sectional survey conducted to identify stress coping strategies and ascertain associations between depression and stress coping strategies in Korean nursing students.

## **B. Subjects**

The study was conducted on university students currently enrolled in universities in metropolitan cities in Korea. A total of 190 university students participated in the survey and excluding the data of 10 subjects who provided insincere responses, a total of 180 surveys were used in the data analysis. A research participation agreement was attached to the survey for data collection to consider the ethical aspects of the subjects by receiving agreement for the fact that the subjects participated by choice, that they could always withdraw if they wanted, that they did not have to respond when they want to avoid exposure of personal information, that survey data would be used only for the purpose of the study, and that anonymity and confidentiality would be guaranteed for the study participants.

## **C. Measurements**

### ***Stress Coping Strategies***

Stress coping strategies were measured with Korea version of Coping Strategy Indicator (K-CSI) which was developed by Amirkhan(1990) and translated by Shin and Kim <sup>9</sup>.

Various coping strategy measurement tools have been developed to more accurately understand coping mechanism and among them, Coping Strategy Indicator(CSI) has been evaluated as a practical coping strategy measurement tool that truly satisfies various psychological measurement requirements.

In Korea, Shin and Kim <sup>9</sup> developed K-CSI to reflect cultural validity. This tool is composed of a survey of 33 questions of self-report questions which is composed of three subscales 'social support seeking', 'problem solving', and 'avoidance'. Each subscale is composed of 11 questions. It is made of three point Likert scale, points of each question are added to calculate the total score and with the score distribution pattern, it can be confirmed which stress coping strategies are used. The Cronbach's  $\alpha$  of all questions was .84 and it was each .90, .88, and .67 for the subscales which showed satisfactory internal consistency.

### ***Depression***

The data was collected using the Korean version of Beck Depression Inventory (K-BDI) for depression <sup>10-11</sup>.

For measuring depression, the 21 question survey of Korean version <sup>10-11</sup> of Beck Depression Scale <sup>12</sup> was used. With a 4-point Likert scale (0-3), it means the higher the score is, the higher the depression is. In this study, Cronbach- $\alpha$  value was .93.

Score distribution of K-BDI that measures depression was 0 to 63 points where total scored points of 0 to 9 is considered normal, 10 to 18 as mild depressive state, and score of over 19 to be severe depression.

## **D. Data Analysis Method**

Collected data were analyzed using the IBM SPSS Statistics Version 22 program. ANOVA was used to compare continuous data. And the correlation between variables was verified using the Pearson's correlation coefficients, and a multiple linear regression of the SPSS/PASW 22.0 program.

## **III. FINDINGS**

Depending on the degree of depression of nursing students, average scores of three kinds among stress coping strategies were significantly different statistically as seen in Table 1 and Figure 1.

In normal group of the K-BDI, the scores of social support seeking strategy and problem-solving strategy were significantly higher than depressive disturbance groups. Meanwhile the score of avoidance strategy among stress coping strategies was significantly lower than depressive disturbance groups. All of these results were statistically significant ( $p < .01$ ) as follows. (Table 1)

Table 1: Descriptive Statistics of Variables

(N=180)

Stress Coping Strategies	Depression	N	Mean	SD	95% CI		F	p
					Lower	Upper		
Social support seeking	Normal	79	25.13	5.28	23.94	26.31	3.674	.003
	Mild mood	59	23.68	4.97	22.38	24.97		
	Borderline	20	23.55	5.52	20.97	26.13		
	Moderate	17	20.47	4.85	17.98	22.96		
	Severe	4	24.00	5.35	15.48	32.52		
	Extreme	1	11.00					
	Subtotal	180	23.93	5.36	23.15	24.72		
Problem-solving	Normal	79	23.56	4.34	22.58	24.53	4.476	.001
	Mild mood	59	21.39	4.79	20.14	22.64		
	Borderline	20	21.65	4.30	19.64	23.66		
	Moderate	17	19.06	4.63	16.68	21.44		
	Severe	4	18.00	5.77	8.81	27.19		
	Extreme	1	16.00					
	Subtotal	180	22.04	4.76	21.34	22.74		
Avoidance	Normal	79	18.35	3.65	17.54	19.17	3.348	.007
	Mild mood	59	19.34	3.52	18.42	20.26		
	Borderline	20	20.00	4.09	18.09	21.91		
	Moderate	17	21.18	3.61	19.32	23.03		
	Severe	4	21.75	3.59	16.03	27.47		
	Extreme	1	27.00					
	Subtotal	180	19.25	3.77	18.70	19.80		

As it can be seen in Figure 1, group with depression levels 1, 2, 3 most frequently use 'social support seeking' among coping strategies and showed a pattern of next most frequent utilization of 'problem solving', and then 'avoidance' coping strategies. The fourth group in K-BDI utilized 'avoidance' among coping strategies and then showed a pattern of next most frequent utilization of 'social support seeking', and then 'problem solving' coping strategies. The fifth group of K-BDI most frequently used 'social support seeking' among coping strategies and showed a pattern of next most frequent utilization of 'avoidance', and then 'problem solving' coping strategies. In the depression group of level 6, 'social support seeking' scores among coping strategies was 11, the minimum score and 'avoidance' score was 27 points which was the maximum.

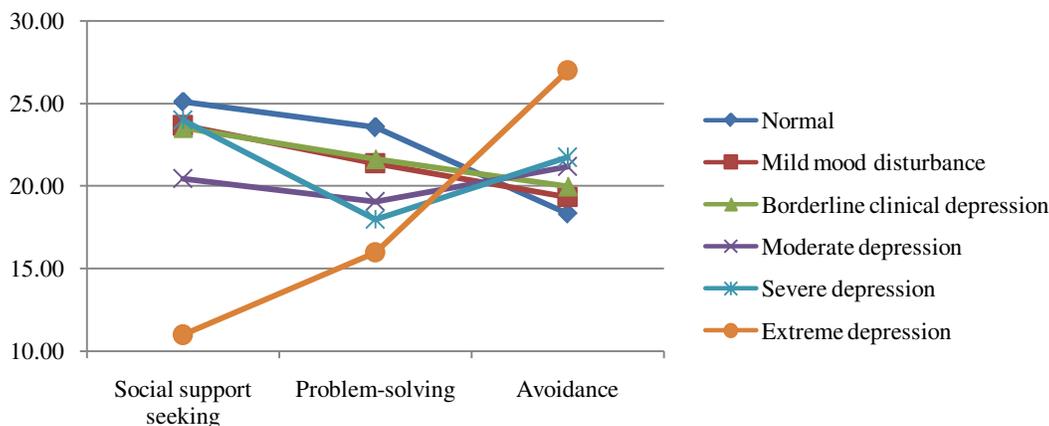


Figure 1: Scores of Stress Coping Strategies According to the Degree of Depression

The depression of nursing students showed significantly negative correlations to social support seeking strategy ( $r = -.289, p < .01$ ) and problem-solving strategy ( $r = -.356, p < .01$ ), and a significantly positive correlations to avoidance strategy ( $r = .281, p < .01$ ) among stress coping strategies as follows. (Table 2)

Table 2: Correlation of K-CSI and K-BDI

(N=180)

Stress Coping Strategies (K-CSI)	Depression (K-BDI)
Social support seeking	-.289**
Problem-solving	-.356**
Avoidance	.281**

\*,  $p < .05$ , \*\*,  $p < .01$

To confirm the factors influencing depression in nursing students, multiple linear regressions were conducted with K-BDI as dependent variable and three types of K-CSI as independent variables. Durbin-Watson statistics that represent autocorrelation of error was 2.25 which denote no autocorrelation. In the result of collinearity diagnostics, tolerance was .771-.986 and VIF was 1.014-1.298 which was all not over 10 and problem of multi collinearity in all independent variables could be eliminated. In the result of residue analysis after multi collinearity verification, Cook's D values of all subjects were below 1.0 and analysis was conducted including all 180, and by confirming the adequacy of the model by testing the normal distribution of error term, it was found that the regression model was significant( $F=14.909, P=.000$ ).

In the result of multiple regression analysis, the K-CSI factors that have the largest influence on the depression of nursing students was in the order of 'problem solving' (-0.257), 'avoidance' (0.241), and 'social support seeking' (-0.151), and the total explanatory power of these variables was 20.3% as seen in Table 3. Thus, among stress coping strategies, higher use of 'avoidance' increased depressive tendencies and use of 'problem solving' and "social support seeking" lowered depressive tendencies.

Table 3: Influencing Factors on Depression

(N=180)

Variables	B	SE	$\beta$	t	AdjustedR <sup>2</sup>	F(p)
(Constant)	17.017	3.765		4.520**	.203	14.909 (.000)
Social support seeking	-0.200	0.101	-0.151	-1.977*		
Problem-solving	-0.383	0.114	-0.257	-3.351**		
Avoidance	0.454	0.128	0.241	3.551**		

\*,  $p < .05$ , \*\*,  $p < .01$

#### IV. CONCLUSION

In this study, normal from K-BDI was 43.9%, mild mood of depression was 32.8%, borderline of depression was 11.1%, and prevalence of depression was 12.2% including moderate, severe, and extreme of depression. In Korean study of Yeun<sup>13</sup> reported that prevalence of depression in Korean college students was 30.1%. And more than 12% of students have suffered from maladjustments, including depression. The above results matched the studies by Yeun<sup>13</sup>.

The study was conducted to confirm depressive tendency related variables in nursing students in the relation between 'social support seeking', 'problem solving', and 'avoidance' of stress coping subarea to establish an effective prevention and intervention strategy for depression for the healthy university life of nursing students.

In this study, nursing students who had used a lot of avoidance strategies against their stress were highly depressed. Meanwhile, the students who had used social support seeking or problem-solving strategies were lowly depressed. The above results matched the studies by Vitaliano<sup>5</sup>, Park<sup>6</sup>, and Kim<sup>7</sup>, but it did not match the study result of Choi<sup>8</sup> and Park<sup>14</sup> on Korean university students.

Choi<sup>8</sup> reported that active coping type on stress had no relation to depression and Park<sup>14</sup> reported that there was significant positive correlation between emotional coping and hopeful coping, and significant negative correlation between problem solving focused coping, and social support seeking coping in university students.

In the study, the direct influence where types of coping with stress explained depression in nursing students was 20.3% which was rather high compared to the 14% in the study results of Park<sup>14</sup>.

These results suggest that stress coping strategies can be potential risk factors for depression in the nursing students.

While depressed people have strong tendency of escaping from self<sup>15</sup> and generally have low self-esteem, fear about rejection, and high desires to be accepted, they have a tendency in actual life to lack interpersonal relation abilities to satisfy these needs<sup>16</sup>.

Furthermore, with higher life stress, more passive coping methods were used, depression and suicidal tendencies were higher, and there was higher tendency of suicidal thoughts with higher depression scores<sup>8</sup>.

Therefore, it is definitely necessary to guide a problem-solving focused active coping method focusing on problems that induce current depression and stress to relieve depression in university students. Like the claims by Park<sup>14</sup> which states higher coping utilization on overall stress has negative influence on depression, it is determined that there is need for provision of consultation and programs for university students not only for problem centered coping in various stress situations but also to increase the ability to utilize more diverse types of coping methods.

These findings will give useful information for constructing an intervening and preventative program focused on stress and depression in the nursing students.

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## A Study on the Influencing Factors of the Resilience among Korean Multicultural Students

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### Abstract---

**Background/Objectives:** The purpose of this study is to investigate the factors that influence on resilience among multicultural adolescents in Korea.

**Methods/Statistical analysis:** Data were collected through questionnaires by resilience scale, Mother's Korean language ability, parent-adolescents communication, parental support scale with youths. Answer sheets from 207 respondents were gathered, and 197 of them were analyzed except for 10 incomplete one. The collected data were analyzed t-test, One way ANOVA, multiple regression with SPSS 18.0 statistical program.

**Findings:** Results indicated that the level of resilience was 3.38 point (ranging 1-5) and parent-adolescent communication was 3.19 point (ranging 1-5). In correlation analysis, the resilience was a significantly positive correlated with parent-child communication ( $r=.50, p<.001$ ), parental support ( $r=.55, p<.001$ ). And also there was positive correlation between parent-child communication and parents support ( $r=.58, p<.001$ ). The multiple regression model had significant goodness-of-fit ( $F=38.86, p<.001$ ) and this variable accounted for 35% of the resilience of multicultural students. Parent-adolescent communication and parents' support influenced on resilience.

**Improvements/Applications:** In conclusion, multicultural adolescents' resilience could be reinforced by parent-child open communication and parents support. Therefore, nursing intervention strategies for adolescents in multicultural families should be considered these factors.

**Keywords---** Resilience, Parental Support, Parent-Adolescent Communication, Multicultural Adolescent.

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## I. INTRODUCTION

The number of emigrants in South Korea has increased since the mid-1990s, due to immigrant wives and migrant foreign workers. Consequently, the number of children offspring of multicultural families has grown rapidly<sup>1</sup>. The majority of migrant women came to marry to Korean men while foreign workers came to earn money<sup>2</sup>. In Korean society, marriage with a foreigner accounts for 8.0% of total marriages. Of the international marriages, 70.5% are between a Korean husband and a foreign woman<sup>3</sup>. As of 2015, the number of minors under age born from at least one foreign parent was 207,693, which quintupled from 44,258 from 2007<sup>4</sup>. Such a rapid growth of multicultural families requires a better understanding of these citizens and a greater responsibility of Korean society.

Adolescence is the period that involves physical, mental, and social growth and maturity, development of ego-consciousness, formation of ego-identity, and redefinition of relationships with parents from dependent to independent ones during the course of transition from childhood to adulthood. For adolescents who spend much time at school, peer relationships and academic performance capability become important and they prepare for responsible adulthood during the process in which entrance into a school of higher grade and career become more specific. During this process, adolescents, who are more emotionally unstable and immature than adults, may have lots of difficulties in making decisions and performing developmental tasks. Stress from the growth and performance of developmental tasks may put even healthy adolescents at a critical moment, and multicultural families with dual cultures can be exposed to relatively more difficulties in diverse situations and contexts<sup>5</sup> and belong to an unprivileged bracket experiencing crisis in the growth period.

The multicultural students could be vulnerable to school violence because of ethnic differences and they can encounter discrimination. The negative experiences such as school violence and discrimination is associated with a high risk of mental illness among teenagers. Because they tend to depend on peers as a source of psychological support<sup>6</sup>. During adolescence, relational problems with parents and peer, academic failure, and various form of school maladjustment manifest such as smoking, alcohol drinking, early sexual behaviors<sup>7</sup>. The adolescents' negative emotional experiences in their childhood might lead to a behavioral problem such as tobacco and alcohol consumption<sup>8</sup>.

Mostly, resilience was explained as protective factor at adversity or a process adjustment to new or difficult situation<sup>9,10</sup>.

Resilience is to avoid breakdown when confronted by stressors differs tremendously among individuals and is a process reflecting positive adaptation in the face of adversity<sup>11</sup>. There are many cross-sectional studies that resilience effect on the perceived stress and it was mediated by positive emotion and cognitive flexibility<sup>12</sup>. And also, resilience demonstrated that it had an effect upon negative anger thought, anger control<sup>13</sup>. The prior study indicated that mother support was associated with decreased depression over time, positive parent-child communication among youth in disadvantaged contexts may help reduce the probability that exposure to violence will result in depressive symptoms<sup>14</sup>.

Family and peer support may be positive factors for adolescents by helping them cope with difficult situation and reducing depression risk, particularly for those living in high-risk environments<sup>15</sup>. More recently, parental support is more robustly associated with decreasing risk of depression<sup>16</sup> and adolescents who reported a high level of family support had higher global self-esteem<sup>17</sup>.

Thus, this study aims to determine the influencing factors on resilience among Korean multicultural students.

## II. RESEARCH METHOD

### A. Study Design

This is a cross-sectional descriptive research to identify the factors affecting the resilience of adolescents in multicultural families

### B. Samples

This study was conducted among 207 adolescents in multicultural families who resided in Seoul Provinces. Adolescents in multicultural families participating in programs at community multicultural family support centers, Rainbow adolescent centers, and foreigner support centers were purposively sampled. The 197

subjects were middle or high school students, those preparing for academic work due to immigration, and dropouts who understood the purpose of the study and agreed to participate voluntarily in the study with their parents' consent because they were adolescents

### **C. Measurements**

#### **Resilience**

For resilience of adolescents in multicultural families, the Resilience Scale of Korean Adolescents was used<sup>18</sup>.

Resilience means the process of recovering one's ability in the socio-cultural context and making positive adaptation even if one is exposed to a risk. The five-point scale contains a total of 14 items, including reliance on the self and others, problem-solving ability, tolerance of negative emotions, and academic competence, with a higher score meaning a higher level of resilience.

For its reliability, Cronbach's  $\alpha=.87$  at the time of development and Cronbach's  $\alpha=.92$  in this study.

#### **Parent-Adolescent Communication**

For communication, the Parent-Adolescent Communication Inventory developed by Barnes and Olson was used<sup>19</sup>. The five-point scale with a total of 10 items, including *I discuss my ideas or beliefs with my parents without hesitation* and *my parents listen carefully to me all the time*, was used for open communication, with a higher score meaning a higher level of open communication. For its reliability, Cronbach's  $\alpha=.86$  in this study.

#### **Parental Support**

For parental support, the parental support scale among Park's<sup>20</sup> Scales for Social Support was used in the areas of emotional, material, and informational support. It is a five-point scale with 3 items, with a higher score meaning a higher level of parental support. For its reliability, Cronbach's  $\alpha=.94$  at the time of development and Cronbach's  $\alpha=.91$  in this study.

#### **Mother's Korean Ability**

For mother's Korean ability, It was estimated writing, speaking, listening, understanding of Korean. It is a five-point scale with 1 item, with a higher score meaning a higher level of Korea ability.

### **D. Data Collection**

The data were collected from September 2 to 30, 2015 for data collection, some community multicultural family support centers in Seoul Provinces were randomly sampled and the chiefs of centers were given explanation of the purpose of the research and were asked to give permission to complete the questionnaire. The researchers made a personal visited on the appointed day and explained the purpose of the research, the ethical aspect, including confidentiality concerning the collected data, and the contents of the questionnaire when the program was completed. After giving the explanation, questionnaires were distributed to adolescents who consented to voluntary participation in the research and were collected immediately after they were completed.

The researcher explained the purpose of the research and confidentiality to the subjects and collected the questionnaires immediately after they were completed. 207 questionnaires were distributed; afterwards, a total of 197 copies were finally analyzed, with the exception of inappropriate ones with no response or overlapped responses.

### **E. Data Analysis**

The collected data were analyzed using SPSS/WIN 20.0 statistical program. Descriptive statistics for all study variables as well as the reliability assessment of the study instruments were computed.

To analyze the differences in the independent and dependent variables, t-tests and One-way ANOVA were used. The correlations among the study variables were analyzed with Pearson's correlation coefficient. Also, multiple regressions were performed to identify factors influencing the subjects' resilience.

### F. Ethical Considerations

Prior to collecting the data, the decision regarding consent for participation was made by adolescents. Subjects also received information on this study including purpose, potential risks, and benefits of this study and the data collection procedures.

After giving the explanation, questionnaires were distributed to adolescents who consented to voluntary participation in the research and subjects who were reluctant to participate in this study could refuse participation at any time.

### G. Limitations

This study was constricted by convenience sampling, which limited generalization to a broad population.

## III. RESULTS

### A. General Characteristics

The baseline characteristics of the study subjects are shown in Table 1. The mean age of the subjects was 14.9 years, evenly ranging from early to late adolescence. 101 multicultural students (48.3%) of them were female. The mean mother's age of the subjects was 41.7years and the mean father's age of the subjects was 46.7years; The most frequent country of origin for mother was China (49.8%), followed by the Philippines(19.3%), Japan(9.6%). and Vietnam(7.1%). The average monthly household income was 1.01-2 million won for 53.3%, 2.01-3 million won for 26.4%, 3.01-4 million won for 9.1%,  $\geq 4.01$  million won for 6.1%, and  $\leq 1$  million won for 4.7%. A mother's Korean language ability was good for 71.7% and average for 25.4%.

Table 1: General Characteristics

(N=197)			
Characteristics	Category	n(%)	Range
Age	(mean $\pm$ SD)	14.9 $\pm$ 1.4	11-18
Gender	Male	96(48.3)	
	Female	101(51.2)	
Mother's Age	(mean $\pm$ SD)	41.7 $\pm$ 5.0	30-52
	30-39	57(28.9)	
	40-49	133(67.5)	
	50-59	7(3.5)	
Father's Age	(mean $\pm$ SD)	46.7 $\pm$ 4.7	35-59
	30-39	12(6.1)	
	40-49	121(61.4)	
	50-59	64(32.5)	
Mother's country	China	98(49.8)	
	Vietnam	14(7.1)	
	Philippines	38(19.3)	
	Japan	19(9.6)	
	Mongolia	6(3.0)	
	Others	22(11.2)	
Monthly income (1,000 won)	Under 1,000	10(5.1)	
	1,000-2,000	105(53.3)	
	2,001-3,000	52(26.4)	
	3,001-4,000	18(9.1)	
	Over 4,000	12(6.1)	
Mother's Korean Language Ability	Bad	7(3.6)	
	Average	50(25.4)	
	Good	140(71.1)	

### B. Descriptive Statistics for Variables

Descriptive statistics for main variables are shown in Table 2. The level of resilience was 3.38 point (ranging 1-5) and parent-adolescent communication was 3.19 point (ranging 1-5).

The level of parents support was 3.55 point (ranging 1-5) and mother's Korean ability is 4.21 point (ranging 1-5).

Table 2: Descriptive Statistics for Variables

Variable	Mean±SD,
Resilience(1~5)	3.38±.69
Parent-adolescent communication(1~5)	3.19±.73
Parental support(1~5)	3.55±.98
Mother's Korean ability(1~5)	4.21±.93

**C. Correlation Among Main Variables**

Correlations are shown in Table 3. There was a significantly positive correlation between resilience and parent-child communication ( $r=.50, p<.001$ ), and parental support ( $r=.55, p<.001$ ). And also there was positive correlation between parent-child communication and parents support ( $r=.58, p<.001$ ).

Table 3: Correlations Among main Variables

	Parent-child communication	Parental support	Mother's Korean ability
Resilience	.50***	.55***	.03(.713)
Parent-adolescent communication	1	0.58***	.12(.079)
Parents support		1	.10(.137)
Mother's Korean ability			1

**D. Difference of Socio-Graphic Variables on Resilience**

Table 4 illustrates Difference of socio-graphic variables on resilience. Gender, mother's age was not significant on resilience. But father's age was significant on resilience. Forties father was significantly higher than thirties and fifties' at their adolescent' resilience.

Table 4: Difference of Socio-Graphic Variables on Resilience

Variables		N	M(SD)	T	Sig.	
Gender	Boy	96	3.38(.78)	6.83	2.83	
	Girl	101	3.37(.61)			
		MSS	Df	M <sup>2</sup>	Sig.	Scheffe test
mother's age	Between-group	2.99	2	1.32	1.05	
	Within group	97.22	195	.46		
	Total	100.21	197			
father's age	Between-group	3.01	2	1.50	.04*	1.3
	Within group	98.35	195	.48		
	Total	101.36	197			

\*  $p<.05$  Group(1: 30-39, 2: 40-49, 3: 50-59)

**E. The Factors Influencing on the Resilience**

Table 5 illustrates the influence of Parent-adolescent communication and Parents' support on resilience. The multiple regression model had significant goodness-of-fit( $F=38.86, p<.001$ ) and this variable accounted for 35% of the resilience of multicultural students. Parent-adolescent communication and parents' support influenced on resilience. The higher the level of parental support ( $\beta =.40, p<.001$ ), the higher the level of resilience. And also, the more good parent-adolescent communication ( $\beta =.28, p<.001$ ), the higher the level of resilience.

Table 5: The Factors Influencing on the Resilience of Multicultural Adolescents

Dependant	Independent variables	B	$\beta$
Resilience	Constant	1.86	
	Parent-adolescent communication	.26	.28***
	Parental support	.29	.40***
R <sup>2</sup>	.36		
adj-R <sup>2</sup>	.35		
F	38.86***		
* $p < .05$ , *** $p < .001$			

#### IV. DISCUSSION

The number of immigrants has increased since the early 1990s in Republic of Korea, largely due to international marriage migrant women. Furthermore, the number of adolescents in multicultural families is now on the rapid increase in South Korea. Many multicultural adolescents have difficulties in school adaptation. Most of the studies on the school adjustment of adolescents in multicultural families focus on the aspect of maladjustment. Actually, many adolescents in multicultural families have difficulties in establishing good peer relations because they are alienated, teased, or bullied or become a victim of violence in schools and have maladjustment problems caused by school under-achievement, increased dropout, and lower rates of school attendance and entrance<sup>21</sup>. But, if adolescents had strong resilience, they will be able to overcome adversity by resilience contributed as a protective factor<sup>22</sup>. It is a responsibility and an obligation of the adults' generation to help multi-cultural adolescents grow to be healthy adult in Korea. Focusing on this issue, this study was tried to identify the factors that influence resilience among adolescents in multicultural families and provide basic data to develop health promotion programs and policies.

The subjects in this study were 14.9 years on average and seemed to have settled in South Korea for  $\geq 10$  years; therefore, their mothers seemed to have reasonable communication. Since 71.7% of the adolescents answered that they had good simulated Korean language proficiency, they are capable of having communication in Korean, as needed to lead a daily life. Many multi-cultural families reportedly suffer from financial difficulties<sup>21</sup>, this study showed that 58.4% of household in the average monthly income was less than two million won. It can be presumed that they belong to the unprivileged bracket that fails to be provided with what is needed for growth and academic work in adolescence fully, taking only the economic factors and the multi-cultural characteristics into account.

In this study, the level of resilience was 3.38 point (ranging 1-5) and parent-adolescent communication was 3.19 point (ranging 1-5). The level of parents support was 3.55 point (ranging 1-5) and mother's Korean ability is 4.21 point (ranging 1-5) and relatively high. It showed that mother's Korean ability was not bad. Moreover, this study showed that significantly positive correlation between resilience and parent-adolescent communication, parental support. However, mother's Korean ability was not significant. The findings were partially supported by prior studies<sup>23,24</sup>. In past studies, the family support and resilience had significant positive relation by Cho and Yoo<sup>23</sup> and Ego resiliency was affected social support<sup>24</sup>. Children in multi-cultural families also have difficulties with academic performance because their mother, who is giving academic support at home, is unfamiliar with the Korean language and culture. Further, parenting attitudes may have a crucial impact on the school adjustment of multi-cultural adolescents: the higher the parenting efficacy of the mother, the better the learning activities and relationships with teachers and peers for multi-cultural adolescents<sup>25</sup>. Children in Mongolian immigrant families have their school adjustment positively affected by social support, such as peer support, family support, and teacher support rather than by the multi-cultural environmental characteristics<sup>26</sup>; therefore, this study supports the results of the previous research.

In multiple regression of resilience, its explanatory power was 35%. It showed that parent-adolescent communication and parental support had an influence on elevating the level of resilience. The findings are similar with the prior studies<sup>24,27</sup>. The ego resiliency was significantly affected by bi-acceptance attitude, peer support, family support<sup>24</sup>. And also, Howard Sharp et al were reported that parental support is possible mechanisms facilitating resilience and growth in child with cancer<sup>28</sup>. Moreover, it should be able to reduce their depressive symptoms by positive parent-child communication<sup>14</sup>. Therefore, in order to increase the level of resilience among multicultural adolescents, educational program for multicultural parents and their

children is needed and its program should be to deal with the importance of parent-adolescent open communication and parental support.

Aggression usually is caused by desire frustration. And also, anger or aggressive behaviors in youth could elusively display as depression<sup>27</sup>. Depressive symptoms were more common among older adolescents who had experienced discrimination<sup>29</sup> and acculturative stress had a significant negative impact on well-being<sup>30</sup>. Therefore, there need to be consider reinforcing adolescents' resilience for school adaptation or social adjustment to overcome adversity.

Generally, resilience has been examined as protective factors buffer or modify the effects of risks over time including through dynamic developmental processes under very difficult circumstances<sup>22</sup>. The current study, also, analyzed affecting factors on resilience of multicultural adolescents in Korea and find out importance of parent support and parent-child communication as influencing factors on resilience. In conclusion, multicultural students' resilience could be reinforced by parent-child communication and parents support. Therefore, nursing intervention strategies for adolescents in multicultural families should be considered these factors.

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## A Research on the Change of Ability to Control Alpha Wave in the HCI Standard Reference Posture

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### Abstract---

**Background/Objective:** Commercialized EEG monitoring technologies present no standard for evaluating conditions on practicing brain self-regulation; in order to verify the standardization of brain self-regulation through a Human Computer Interface reference posture.

**Methods:** Both Autogenic Training (AT) and ANSI/HFES 100 HCI reference postures were studied for similarities and differences. From these, six postures were similar and two other postures were somewhat different. To verify availability in applying the reference posture of ANSI/HFES 100-2007 in measuring brain waves as a standard posture, this thesis measured the brain wave of users after practicing AT in an upright sitting posture, for those already having acquired AT.

**Findings:** Brain waves recorded for 120 seconds from 6 participants at an upright sitting posture, who had acquired the ability to enter an autogenic shift within 10 seconds. The  $\alpha$ -wave made up 16~21% while the  $\theta$ -wave was 27~29% of the brain waves. Training was applicable to all the users despite the users having differences positioning their head downward or not and their arms and hands resting on their knees or not, with differences in the leaning posture of AT and the comfortable workspace posture of ANSI/HFES100. The results indicated that measuring brain waves after training for self-regulation just like the reference posture allows for maintaining a state of very high concentration. As such, there is a need for defining concentration standards by conducting a comparison of brain waves in general and after training self-regulating brain, both under the HCI (Human Computer Interface) conditions. In addition, a study on brain wave changes for untrained and subsequently trained users, both at the HCI posture, seems necessary.

**Application:** The methodology allows for quantifying how much concentration is present for a user interacting with a computer in situations such as controlling equipment remotely or in an education setting.

**Keywords---** Brain Wave, HFES 100, HCI, Alpha Wave, Theta wave.

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## I. INTRODUCTION

The World Health Organization (WHO) defines health as having "physical, mental, social wellness." This emphasizes that the importance of physical health, but also the concepts of mental and social adaptation being significant for the overall health status of an individual<sup>1</sup>. Maintaining brain health, required for mental and social wellness along with various health elements, has become a difficult problem in the society and the goal of significant research. The research areas involves studying the self-regulating brain as part of the healthy brain research as part of in various fields of studies such as psychology, cognitive science, medicine and computer engineering<sup>2,3,4,5,6</sup>. One representative training is Autogenic Training and NeuroFeedBack training<sup>2,6,7,8</sup>. Currently, the brain health can be examined by brain wave measurement through a self-regulating brain<sup>9,10</sup>.

Brain wave measurement involves recording the electrical rhythm in a curve of leading and increasing the differences in electric potential representing the activity of the brain cell. It was first described by the German psychiatrist Hans Berger in 1929, and became a significant physiological signal measurement in psychiatric and brain function monitoring applications. Even when just lying around or sleeping, brain activity never ceases and complicated waveforms are present. Brain wave is used in a wide array of diagnoses for brain-related conditions such as epilepsy, brain tumor, sleep disorder, stress relief and others<sup>2</sup>.

The types of brain wave are the delta waves (frequency of 0 ~ 3 Hz) for deep sleep, theta waves (4~7 Hz) for sleep, alpha waves (8~12 Hz) for stable and resting condition, beta waves (21~50 Hz) for when performing a task, or when in stressed or excited conditions<sup>2,4</sup>. A major objective is to use brain wave activity to study and seek improved brain health as the electric signals are a reflection of the natural electrical biorhythms due to brain action and the subject's thinking.

Currently with improvements in computer technology, there are also brainwave measuring equipment of different types. Also, the EEG (electroencephalography) brain wave measuring devices have become more portable and are available commercially<sup>11,12</sup>, and this includes brain monitoring and brain feedback technologies. In addition, uses have expanded from medical applications to gaming, security, education and training. The study of brain waves and monitoring has also expanded in the field of medicine; however, its use is just starting to develop in the fields of education and training. The uptake in these two areas is very slow due to characteristics of the brain wave<sup>3,8,13,14,15</sup>.

A study of how brain training may be useful in conditions of human and computer interaction is required, and also on how this interaction is maintained. This study uses portable brain-wave measurement equipment to assay the various alpha/theta wave control and improvement protocols. The findings may be directly put to use for cases of promoting remote-control learning through brain-wave control, in applications such piloting planes and ships by remote control.

## II. TECHNOLOGY OVERVIEW

### A *Lighter and More Affordable EEG Equipment*

Among various technologies for obtaining physical information on the human body and for measuring micro signals from the brain, EEG has been the traditional method. Recently, there have been many EEG equipment on the market, varying in portability and price<sup>11,12</sup>. The price range for the equipment has been from hundreds to more than a thousand dollars. With IoT experimental equipment, there is also rapid assessment and integration with Internet. As part of a 4th industrial revolution, EEG is developing to a major technology with applications in a hyper-connected society that is quickly becoming hyper-stimulated society. Moreover, most portable equipment is now being developed linked to a smart phone and being improved for ease of use in data collection, and for EEG, assaying for brain-wave changes.

### B *Development of Self-Regulating Brain Control Technology*

It has been shown that neuro feedback and Autogenic Training, reflecting changes in alpha and theta wave-forms, improve body stabilization and concentration<sup>2,6,8</sup>. In terms of maintaining the brain waves in the alpha mode, there is a need to objectively measure how the status can be accurately sustained as required for using remote-control equipment and educating the users utilizing such technology. Advances in technology for computer and human interaction through self-regulating brain training is becoming significant, and autogenic and biofeedback training in which the trainer directly affects the brain wave improves alpha and

theta wave generation, and increases concentration. Alpha and theta brain wave is also known as a major index in measuring whether the human intelligence is integrated.

### **EEG NFB(Neuro Feed Back) Training**

Neuro Feedback is a type of biofeedback, also termed EEG biofeedback. The technique of biofeedback was introduced to the psychiatric clinics long time ago and has been in use ever since<sup>2,8</sup>. Excluding the autonomic nervous system, Neuro Feedback only applies to brain waves. This is applying the EEG operant conditioning to the brain wave. Recently, the brain wave became capable of being analyzed according to the time and space coordinates and biofeedback was conducted by choosing the brain wave from a specific portion.

### **Autogenic Training (AT)**

Autogenic Training is a self-training method first developed by the German doctor J.H. Schultz in 1926, which uses a step by step implication, starting from controlling muscles to addressing the circulatory system, heart, breathing, abdomen, and cephalic systems. In this training, the trainer repeats the self-proposed formula inside ones brain to conduct autonomous relaxation mentally and physically. This training is a significant self-control training method that improves the alpha and theta waves generated along with biofeedback training<sup>6,7</sup>. This study uses the program proposed by Rhee Jyoo-Hi (2006), who acquired it from Germany and later proposed 8 weeks of standardized composition. The program is described in Table 1. Each step has a relevant formula, and according to the instruction from the instructor, the formula is adapted to go into passive concentration focusing on a specific body part<sup>7</sup>.

Table 1: Contents and Process of Autogenic Training

Week	Title	Content and Activity	Objective and Effect
1	Heaviness training	<ul style="list-style-type: none"> <li>- Introduce the therapist and group members</li> <li>- Explain the concept of training and relaxation</li> <li>- Experience heaviness of the right side of arm</li> <li>- 'Right arm is heavy'</li> <li>- Significance of a week of training and assignment, explain how to conduct assignment</li> </ul>	Muscle Relaxation
2	Warm sensation training	<ul style="list-style-type: none"> <li>- Promote the weekly training</li> <li>- Experience warm sensation on the right arm</li> <li>- Provide a guide to warm sensation</li> <li>- Prior formula + 'Right arm is warm'</li> </ul>	Relaxation
3	Breathing training	<ul style="list-style-type: none"> <li>- Promote the weekly training</li> <li>- Experience natural and relaxed breathing</li> <li>- Provide guide to relaxed breathing</li> <li>- Prior formula + 'Still and regular breathing'</li> </ul>	Breath tuning
4	Mid-term review	<ul style="list-style-type: none"> <li>- Promote the weekly training</li> <li>- Review the entire heaviness, warm sensation and breathing from week 1 to 3.</li> <li>- Share the uncomfortable or relaxed feeling experienced during practice</li> <li>- Training enhance through dissolving inconvenience and discouragement element for assignments.</li> </ul>	
5	Abdomen practice	<ul style="list-style-type: none"> <li>- Promote the weekly training</li> <li>- Concentrate on the autonomic nervous system and experience relaxation of the abdomen</li> <li>- Prior formula + 'Feel the warmth in the solar plexus'</li> </ul>	Abdominal relaxation
6	Forehead cold fiber practice	<ul style="list-style-type: none"> <li>- Promote the weekly training</li> <li>- Experience the cool feeling on the forehead</li> <li>- Prior formula + 'Feel the coolness on the forehead'</li> </ul>	Thoughts and emotion cleansing
7	Heart practice	<ul style="list-style-type: none"> <li>- Promote the weekly training</li> <li>- Concentrate on heart and experience relaxation in heart</li> <li>- Prior formula + 'Feel the coolness on the forehead'</li> </ul>	Heartbeat tuning
8	Total review and examination	<ul style="list-style-type: none"> <li>- Promote the weekly training</li> <li>- Check if the experience of relaxation has changed</li> <li>- Individual guideline for practice</li> </ul>	

### **Methodology for Interacting with Computer**

There are two ways for human and computer to interact: direct interaction and an indirect interaction through a medium. The direct interaction includes interaction with sensors on the skin or under the skin, or an interaction accepting information through vision and hearing. For indirect interaction, there is medium

that recognizes and decides on the information through the five senses, and then operating the input devices such as mouse and touch pad as a result<sup>16</sup>.

In November 2007, the American National Standards Institute approved ANSI/HFES 100-2007, Human Factors Engineering of Computer Workstations as an American National Standard. It provides specific guidance for design and installation of computer workstations, including displays, input devices, and furniture that will accommodate a wide variety of users.

The ANSI/HFES 100-2007 provides for standards in design and engineering to enable an optimal interaction between the computer and person sitting at a computer workstation. The standards are utilized to see if a normal recognition function properly provides for a concentrated environment when regularly using the workstation. By improving its availability, the workstation allows for learning to become easier. This is accomplished by improving the operation ability and error restoration on the part of the user, and maintaining a minimized posture change to maintain user ability. The four ANSI/HFES 100-2007 reference postures are described in Figure 1.

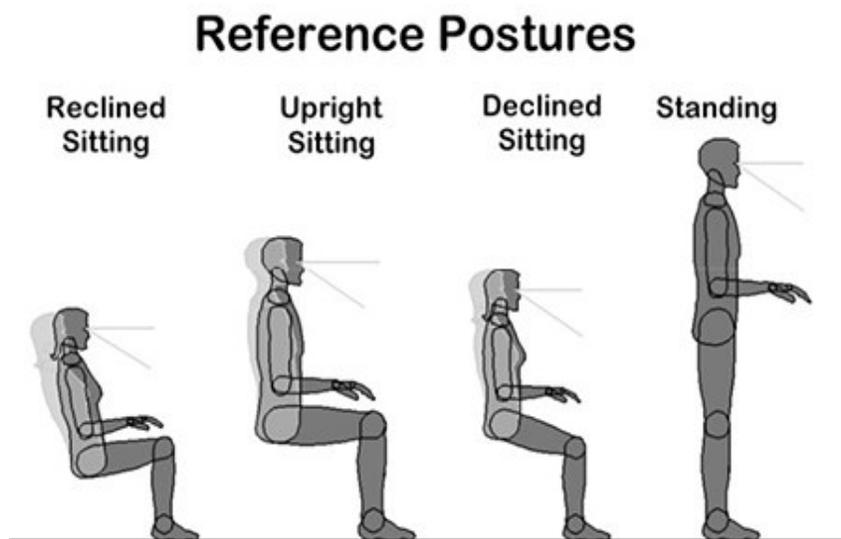


Figure 1: Four Reference Postures at ANSI/HFES 100-2007

The standard recognizes that VDT users frequently change their working postures to maintain comfort and productivity, and the four reference postures used in this standard represent a range of postures observed at computer workstations<sup>16</sup>. ANSI/HFES 100-2007 proposes a comfortable workspace. In detail, it specifies that the shoulders be lowered, and having the arm and hand be in a straight line, and the elbow-lower arm be laid horizontally with the floor or a bit higher. The lower back is supported, the thigh is horizontal and the head and monitor has 45~70 cm (18~28 inch) gap in between them. The upper screen is on the eye level or a bit lower. The height of the monitor is adjusted by supporting the monitor with objects and heightening the operation desk, such that the monitor should avoid reflected light. There should be no object under the desk and the feet are laid flat on the floor<sup>16</sup>.

Such posture is very similar to the lean-on and sit posture among the postures in the AT field. Lowering shoulder, making hand and arm a straight line, and flattened feet make for a comfortable posture.

### III. PRECEDING STUDIES

"The Effects of the Concentration and Imagery Through the Regulation of the Brain Wave on the Performance Learning of Golf Putting" by Kim Jae Hun conducted an experiment in which the computer simulated shooting of the target starts when the subject generates the alpha wave<sup>3</sup>. In the reports, "A Study on the Improvement of Concentration through Serious Games" by ChoSeungJu and "Development of the Game for Increasing Intensive Power using EEG Signal" by Lee Chang Jo and others<sup>4,13</sup>, experiments were conducted using the brain-wave concentration index with the index defined as follows:

$$\text{Power Ratio of } \frac{SMR+Mid \beta}{\theta} \quad (1)$$

“The Comparison of EEG Activity by Computer Assisted Cognitive Rehabilitation Program in the Normal Elderly” and “The Elderly With Dementia” by Kang Won Ku studies have conducted experiments which defines concentration point as the ratio of the concentration index ( $SMR/\theta$ ) and activation index ( $(\text{slow } \beta)/\alpha$ )<sup>5</sup>. Those studies on defining concentration through EEG mainly relied on simulation screen moves or quantifying concentration through the concentration index using the brain wave ratio calculated by EEG.

#### IV. STUDY METHOD

With applications in the education field, this study was to verify whether self-regulating brain training could become a fundamental evaluation material for remotely controlled equipment. The equipment used brain-wave interaction for developing concentration abilities and the subject was in the standard posture for HCI (Human Computer Interface). The study subjected users who could get into a relaxation mode within 10 seconds through AT. The reference posture of ANSI/HFES 100-2007 was applied for interaction with the computer. The study subjects first conducted AT in the upright sitting position and also monitored their brain wave patterns. The recommended postures between both are described in Figure 2.

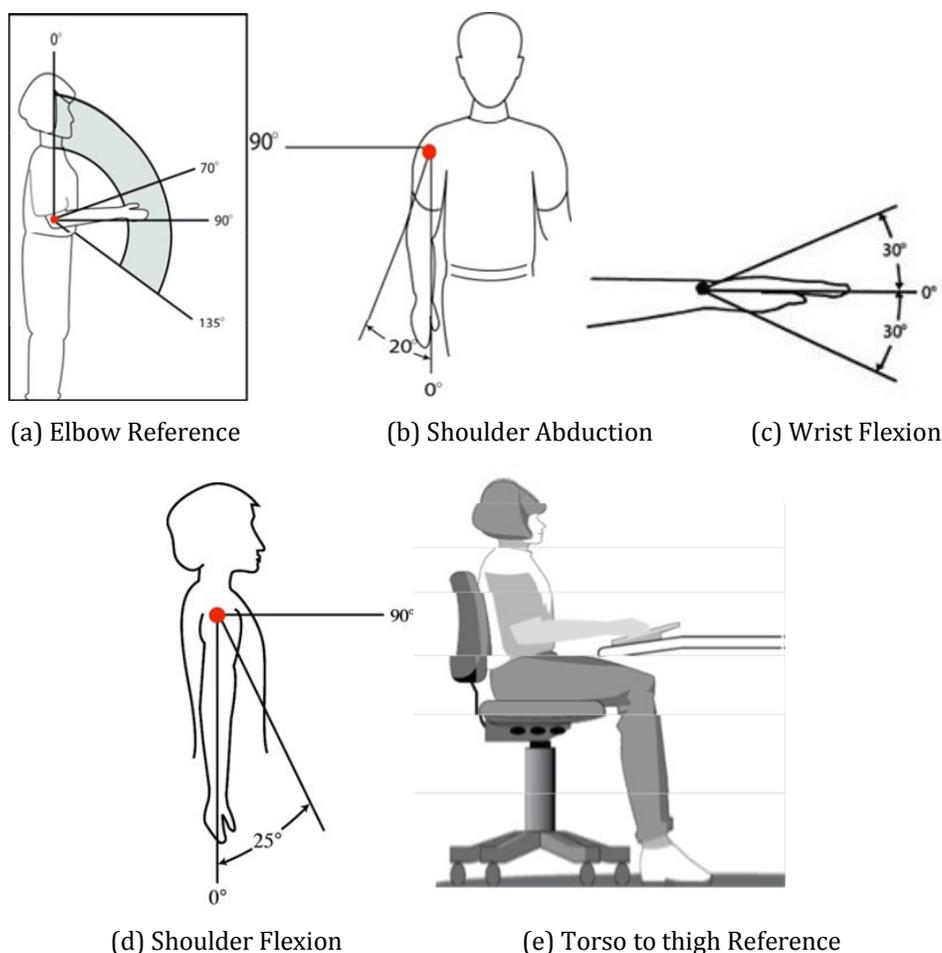


Figure 2: Recommended Postures

The study subjects first learned AT, and were then explained the differences with ANSI/HFES 100-2007 reference posture. They were then conducted the experiment. It was verified that all the postures from Figure 2—namely, (a) elbow reference(see elbow), (b) shoulder Abduction(widened shoulder), (c) wrist flexion(bent wrist), (d) shoulder flexion(bent shoulder), and (e) torso to thigh reference(see upper body and thigh)—were similar to the postures from AT. The similarities between them are described in Table 2.

Table 2: Similarities of Leaning and Sitting Postures and Comfortable Workspace Posture of ANSI/HFES100

Autogenic Training Posture	Comfortable workspace at ANSI/HFES 100-2007
Relax shoulder in comfortable condition	Lower shoulder
Support back on the chair	Support the lower back
Put thigh horizontally	Put thigh horizontally
Stick sole on the floor and make it comfortable	Put feet on the floor flattened.
Put arm and hand lightly on both knees.	Put arm and hand in a straight line
	Make arm(elbow) horizontal or a bit higher then horizontal
Put arm and hand lightly on both knees.	Put arm and hand in a straight line and make arm(elbow) horizontal or a bit higher than horizontal

The similarities and differences of leaning posture for AT and the comfortable workspace postures for ANSI/HFES 100 were distinguished. As shown in Figure 2, the reference and the AT positions for shoulder, back, thigh and sole are similar. The arm and hand positions show some differences, but there are within the allowed range for the reference posture. The AT neck position is different from that of the reference posture. This, however, does not deviate from elbow reference, shoulder abduction, and wrist flexion as in Figure 2. The differences are described in Table 3.

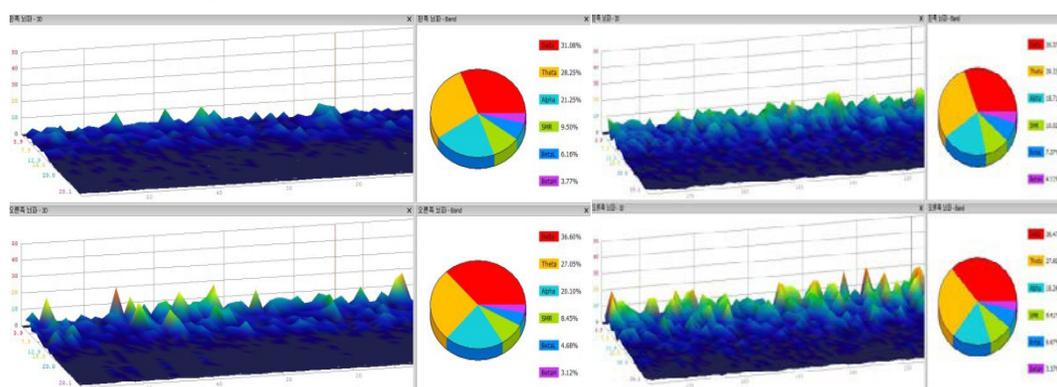
Table 3: Differences of Lean and Sitting Posture of AT and Comfortable Workspace Posture of ANSI/HFES100

Autogenic Training Posture	Comfortable workspace at ANSI/HFES 100-2007
Lower the head	Have the head face the screen horizontally.

Therefore, when operating a computer screen after AT, the two movements, raising head and using the computer mouse were different.

## V. EXPERIMENTAL METHOD AND RESULTS

As for the brain wave training with EEG-NFB, a two-channel brain wave measuring equipment developed by the Korea Psychiatry Institute was used. Also, the Autogenic Training to conduct alpha wave improvement training was adapted from the standard AT program conducted at the Rhee Jyoo-Hi Research Lab. The study started with 2 groups of 10 people each, but there were only 6 subjects who achieved the ability to enter into an autogenic shift within 10 seconds, and that was the goal of Autogenic Training after 8 weeks of training. The 6 subjects were measured for brain wave activity for 120 seconds in a waiting position after AT in an upright sitting posture. Figure 3 shows the brain wave from 2 subjects.



(a) Brain Wave for Subject 1 (b) Brain Wave for Subject 2

Figure 3: Brain Wave During the Waiting Condition After AT

## VI. DISCUSSION

For a more elaborate study, the brain wave examination in the HCI reference posture from more users is needed. The experimental data in this study recorded 16~21% alpha wave and 27~29% theta wave during

120 seconds as shown in Figure 3 from the subjects. The results indicated that the subject with measuring brain waves after a self-regulating training in reference posture could maintain very high level of concentration. As such, the technique in the study quantifies concentration based on a mutual comparison of the brain wave after self-regulating brain training and the brain wave in general both under the HCI conditions. A comparative study would also have to analyze the brain waves during self-regulating training conditions with the subject attached to brain wave monitoring equipment and interacting with a computer, thus allowing to assay relevant indexes, including the extent of concentration. Such studies would allow for distinguishing various brain wave forms such as studying in the HCI condition and concentrating on learning. The findings would allow for developing novel means of interacting method between a student and an instructor such as in a remote-control based education setting. In particular, as the SMR wave accounted for about 10% of the brain waves, the recording allowed an assay of the creative form of the brain. It seems there is a need for future studies on how to maintain a high SMR wave in computer interaction settings.

## VII. CONCLUSION

Brain wave measuring equipment based on BCI (Brain Computer Interface) have evolved into ones that are both affordable and portable. Recently, the brain monitoring and the brain controlling technologies have been in the spotlight and may become popularly applicable. With such technologies, applications to the alpha wave generated by neuro feedback training and Autogenic Training allows for improvements in physical and mental stability along with better concentration for the subject using them. There is a definite need to incorporate the ability to maintain the brain wave in the alpha mode as a method of maintaining a high concentrated condition with remote-control equipment or in the field of education utilizing such technology.

This study has conducted alpha wave improvement training through 8 weeks of Autogenic Training along with EEG-NFB (EEG Neuro feedback Training). The study observed brain wave of 6 subjects who obtained alpha wave controlling ability, and there is a need for additional studies for developing a concentration standard through a mutual comparison between brain wave in general and after self-regulating brain training both under the HCI conditions. Also, a comparative study will be able to calculate the relevant indexes after brain wave measuring under self-regulating brain training conditions and interacting with a computer.

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## The Relationship between Self-Compassion and Academic Stress in Nursing Students

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### Abstract---

**Background/Objectives:** Recent research indicates that nursing students experience high level of academic stress. The purpose of this study was to describe the relationship between self-compassion and academic stress in nursing students.

**Methods/Statistical analysis:** The data were collected using questionnaire consisting of the self-compassion scale (K-SCS) and the academic stress scale. The participants were 170 nursing students who are currently in third and fourth year of their undergraduate program. The analyses were performed using IBM SPSS 19.0. The data were analyzed with descriptive study, t-test, ANOVA, post-hoc test, and Pearson's correlation coefficient.

**Findings:** Mean K-SCS score was  $81.48 \pm 12.30$  (range=30-108), and academic stress was  $11.32 \pm 3.60$  (range=3-24). Correlations revealed that self-compassion correlated negatively with academic stress ( $r = -.309$ ,  $p < .001$ ).

**Improvements/Applications:** This study suggests that self-compassion enhancement may relieve academic stress among nursing students.

**Keywords---** Self-Compassion, Academic Stress, Nursing Student, College, Relationship.

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## I. INTRODUCTION

College students stand a situation between adolescent and adult. And they should adapt to a new environment, college life. According to one study on the life stress in college students<sup>1</sup>, they perceive stress over career, interpersonal relationships, economic problems, values, and study. College stress is negative relation with depression and self-efficacy<sup>2,3</sup>. Academic stress has been linked to negative outcomes in the academic domain. For example, research revealed significant negative effects on depression<sup>3</sup>. Academic stress also negatively influenced on satisfaction of college adaptation<sup>4</sup>. Thus, it is important to control academic stress in college students. Chon & Kim suggest the need for individualized intervention because their stress levels differ from their majors<sup>1</sup>. In nursing students, the level of academic stress is the highest among other stressors<sup>5</sup>.

Self-compassion is the concept based on Buddhist philosophy. Neff defined self-compassion as being touched by and open to one's own suffering, not avoiding or disconnecting from it, generating the desire to alleviate one's suffering and to heal oneself with kindness<sup>6</sup>. Self-compassion has been related to beneficial effects in several areas. One study reported that self-compassion enhancement effects on relieving stress<sup>7</sup>. One research has shown that self-compassion increased immunity and relieved stress in health adults<sup>8</sup>. And another study reported that self-compassion increased satisfactions of life in adults<sup>9</sup>. We expect individuals who have high level of self-compassion manage well their stress. We were interested in investigate the relationship between self-compassion and academic stress in nursing students. Therefore, we hypothesized that self-compassion would be correlated negatively with academic stress.

## II. MATERIALS AND METHODS

### A. Study Design

This study used a descriptive design to examine a relationship between self-compassion and academic stress among nursing students.

### B. Sample

Participants consisted of nursing students in two nursing colleges. To determine the appropriate number of participants, we calculated the sample size using G-power 3.1 program. Based on a significance level ( $\alpha$ ) of 0.05, a statistical power ( $1-\beta$ ) of 0.95, an effect size of 0.3, the minimum sample size of 138 respondents was calculated for correlation analysis.

### C. Measurements/Instruments

The self-compassion was measured by Korean version of the self-compassion scale (K-SCS; a 26 item scale) translated and validated by Jin & Lee<sup>10</sup>. SCS was developed by Neff<sup>11</sup>. All items were measured using a 5-point Likert-type scale (1 to 5 points), where higher scores indicated stronger self-compassion. Lee reported a Cronbach's alpha coefficient .87. In this study, the internal reliability coefficient (Cronbach's alpha) was .89.

The academic stress was measured by subscale for academic stress of revised Life Stress Scale for college students, which consists of 7-items scored with a 4-point Likert-type scale (0 to 3 points)<sup>1</sup>. Chon reported a Cronbach's alpha coefficient of .75. In this study, a Cronbach's alpha of academic stress was .80. Higher total scores suggest higher level of academic stress.

### D. Data Collection

We visited two colleges. After explaining the study purpose, procedure, participants' right, potential benefits, and rewards, written informed consent forms were obtained. The data collection period was between 4 and 22, April, 2016.

### E. Data Analysis

The analyses were performed using IBM SPSS 19.0. General characteristics and degree of variables were analyzed using descriptive statics. Pearson correlation coefficient was used to examine the relationship between self-compassion and academic stress.

### III. RESULTS

#### A. General Characteristics

General characteristics of participants were presented Table 1. A total 170 nursing students participated in the study. The majority of participants were female (n=157, 92.4%), over half (n=89, 52.4%) were junior nursing students. 71.2% (n=121) of participants drink alcohol. 38.8% of participants entered nursing school for employment, 21.2% aptitude, 17.6% other's recommendation, and 11.8% identified as profession. 58.2% of participants answered that they have a good interpersonal relationship.

Table 1: General Characteristics (N=170)

Variables		n	%
Sex	Female	157	92.4
	Male	13	7.6
Grade	3rd	89	52.4
	4th	81	47.6
Drinking	Drinking	121	71.2
	Non-drinking	49	28.8
Reason for entering nursing	Employment	66	38.8
	Aptitude	36	21.2
	Economic safety	9	5.3
	Profession	20	11.8
	Academic score	9	5.3
Interpersonal relationship	Other's recommendation	30	17.6
	Good	99	58.2
	Fair	62	36.5
	Bad	9	5.3

#### B. Degree of Variables

Table 2 shows the means and standard deviations. Mean K-SCS score was 81.48 (SD=12.30; range=30-108), and academic stress was 11.32 (SD=3.60; range=3-21).

Table 2: Degree of Variables

Variables	Min	Max	M±SD
K-SCS	30.00	108.00	81.48±12.30
Academic Stress	3.00	21.00	11.32±3.60

#### C. Differences in Variables According to General Characteristics

Table 3 shows the differences in K-SCS and academic stress according to general characteristics. There was a significant difference in K-SCS according to interpersonal relationship (F=12.58, p<.001). The K-SCS score for participants replied that they have fair or good interpersonal relationships were significantly higher than that they have bad relationships.

Other general characteristics were not significantly differences in K-SCS and academic stress.

Table 3: The Differences in Variables According to General Characteristics

Variables		K-SCS		Academic stress	
		M±SD	t/F (p) Scheffe	M±SD	t/F (p)
Sex	Female	81.35±12.45	0.49 (.628)	11.38±3.63	0.66 (.513)
	Male	83.08±10.70		10.69±3.30	
Grade	3rd	81.55±12.03	0.08 (.940)	11.15±3.94	0.67(.503)
	4th	81.41±12.67		11.52±3.21	
Drinking	Drinking	81.07±11.74	0.69 (.490)	11.49±3.34	0.93 (.352)
	Non-drinking	82.51±13.70		10.92±4.20	
Reason for entering nursing	Employment	79.88±13.11	1.16 (.330)	11.58±3.79	1.49 (.196)
	Aptitude	84.64±12.54		10.28±3.10	
	Economic safety	81.56±8.72		11.89±4.94	
	Profession	83.95±8.07		12.00±2.97	
	Academic score	76.56±5.64		13.22±3.27	
Interpersonal relationship	Other's recommendation	81.03±14.29	12.58 (<.001)	10.83±3.63	1.72 (.182)
	Good <sup>a</sup>	84.06±11.13		11.28±3.60	
	Fair <sup>b</sup>	79.79±11.07		11.08±3.66	
	Bad <sup>c</sup>	64.78±18.05	a,b>c	13.44±2.88	

**D. Relationship between K-SCS and Academic Stress**

Analysis revealed statistically negative significant relationship between K-SCS and academic stress (r=-.309, p<.001) (Table 4).

Table 4: Correlation between Two Variables

	Academic Stressr(p)
K-SCS	-.309(<.001)

**IV. DISCUSSION**

In this study, participants' level of K-SCS was 81.48. In a previous study in which the same tool was used as in this study, K-SCS was 80.91<sup>9</sup> and 82.97<sup>12</sup> in college students, and 93.74 in Portugal nurses<sup>13</sup>. So, K-SCS level in this study was similar to previous studies.

In the present study, academic stress level was 11.32. This finding has not been reported in previous studies. In a previous study with nursing students, academic stress was somewhat higher than our result<sup>5</sup>. In addition, any other study's academic stress was higher<sup>14</sup> than ours. In this study, the subjects are junior and senior nursing students. On the other hand, participants of above studies were all graders of college. We thought study participants caused the differences among our results and previous studies. But some studies reported that there was no difference in academic stress according to the grade<sup>14,15</sup>. Therefore it is hard to explain our result that was caused by participants. Though stress level of our participants was lower than previous studies, academic stress was associated with depression, major satisfaction, and college adaptation<sup>3,16</sup>. Academic stress was even correlated with suicidal idea among nursing students<sup>5</sup>. So, it is important to investigate academic stress among nursing students continuously.

There was a difference in K-SCS according to interpersonal relationship. Self-compassion defined having a gentle and understanding attitude towards oneself and to be kinder to others than themselves in suffering environment<sup>11</sup>, which may influence on this result.

In this study, there were no differences in academic stress according to general characteristics. The participants who entered nursing school because of their high school score had the lowest academic stress, although the difference was not statistically significant. In a previous study with junior nursing students<sup>17</sup>, they had the lowest academic stress that entered nursing school for fit to school grades. It seems that nursing students who entered nursing college for fit high school score have confidence in studying nursing. On the other hand, we could consider that they have low learning will. In case of the latter, it would prevent them from getting professional nursing capacities. Therefore, it is important to investigate the learning attitude of nursing students who entered nursing school for fit to school grades.

As we expected, it was found that academic stress was negatively related to self-compassion. A previous study has shown that self-compassion was significantly negative relation with life stress among college students, too<sup>9</sup>. Our study supports a previous study that self-compassion would reduce stress symptom<sup>12</sup>. Since self-compassion program reduced stress responses<sup>8</sup>, it would be an effective management for nursing students, too.

This result suggests that self-compassion is the way to relieve academic stress among nursing students. Therefore, approaches to improve self-compassion and confirmation of the effects are necessary.

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## The Longitudinal Studies on Children's School Adjustment Across Gender

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### Abstract---

**Background/Objectives:** There are few studies concerning the developmental changes in elementary school children's adjustment. This study examined the developmental changes of children's school adjustment and determine whether the changes in children's school adjustment differed by gender.

**Methods/Statistical analysis:** The participants were 1,977 elementary school students who were assessed in the first, second, third, fourth and fifth grade. Data were collected from the KCYPS panel survey of 1st graders cohort from 2010 to 2014. Descriptive statistics and several repeated measure ANOVAs were used.

**Findings:** Results of ANOVA with repeated measure indicate that children's school adjustment differ across grade and gender.

**Improvements/Applications:** This study confirmed the developmental changes of school adjustment and gender differences in school adjustment. A differentiated approach was needed to improve boys' and girls' school adjustment.

**Keywords---** Longitudinal Study, Children's School Adjustment, Gender Difference, KCYPS.

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## I. INTRODUCTION

The school environment is one of the most influential socialization domains in children's life<sup>1</sup>. Children face diverse adjustments after entering elementary school; they have to learn new knowledge about language, math, and science and so on. They have to meet new friends and teachers and keep a good relationship with them. Also, they have to get accustomed to new school rules and follow them. Children who can successfully win out early school environments start on a better position and keep on benefiting from their experience as they go through school life.

In the past, school adjustment has been assumed as children's academic progress or achievement<sup>2</sup>. On a broader level, school adjustment includes their attitudes toward school, motivation, and relationship, as well as children's progress and achievement<sup>2,3</sup>; therefore, it's not easy to define school adjustment simply. School adjustment requires multiple adjustments in the emotional, social, and cognitive aspects<sup>4</sup>. It demands children to adjust themselves to day structure, behavioral norms, and school rules. School adjustment is the degree of school adaptations required for maximizing the educational fit between the children's individual characteristics and the nature of school environments<sup>5</sup>. Therefore, the children's school adjustment relies on the balance between their competencies and the demands of the school environment.

School adjustment, which includes self-regulation, school preference, peer competence, and academic competence in the school, is associated with children's success in school<sup>2,6</sup>. Several types of research have indicated that children's various experiences and adjustment at school can influence their development<sup>6,7</sup>. The better the children have a relationship with peers and teachers, the more the children receive academic motivation<sup>8</sup>. On the other hand, the children who have difficulty in making good relationships with peers and teachers are more likely to have negative emotions (e.g. loneliness, anxiety, and depression) and antisocial behavior<sup>9</sup>.

Also, children's abilities to plan and work out the coping strategy in the early school years are significant factors in creating a developmental trajectory of academic and behavioral outcomes<sup>10,11</sup>. Children experience changes in teachers, peers, classroom environments, and the difficulty of courses every year. For these reasons, the children's school adjustment may fluctuate across the years, and children's school adjustment may vary across different domains within the same year as children's school adjustment maybe affected by interconnected factors<sup>5</sup>. Children's school learning achievement can be improved with the support of their peers and teachers<sup>8,12</sup>; in turn, children's positive interpersonal relationship can be promoted by their improved cognitive competence.

There are many studies concerning children's school adjustment and the variables related to children's school adjustment<sup>13</sup>; however, few studies were conducted trajectory to children's school adjustment. Therefore, this study tried to investigate how Korean children's school adjustment is changed as they grow up. This study also used the data collected by the Korean Children and Youth Panel Survey (KCYPS), which was a representative sample of Korean youth.

The studies on school adjustment concerning gender differences showed an inconsistent result. Some studies reported that school adaptation differed across gender<sup>14</sup>; however, other studies showed a similar adjustment for boys and girls<sup>15</sup>. Also, the trend on the developmental changes of boys' and girls' school adjustment was not fully investigated. Therefore, this study examined the trend of developmental changes on school adjustment and determined the difference in school adjustment by grade and gender by following children assessed at 1<sup>st</sup> grade through 5<sup>th</sup> grade in elementary school in Korea

## II. MATERIALS AND METHODS

### A. Participants

This is a longitudinal study designed to examine the developmental changes of children's school adjustment by gender and grade in Korea. Participants were 1,977 elementary school students. Participants were surveyed from the 1<sup>st</sup> grade through the 5<sup>th</sup> grade respectively, which belonged to the 1<sup>st</sup> elementary school cohort panel of the KCYPS. This study used the data collected by the KCYPS from 2010 through 2014. To be included in this study, children should have all information at 5-time points: the 1<sup>st</sup> grade; 2<sup>nd</sup> grade; 3<sup>rd</sup> grade; 4<sup>th</sup> grade; 5<sup>th</sup> grade. The written informed consent of the participants and their parents was obtained before this study.

**B. Measurements**

**School Adjustment**

School adjustment constructs include school learning, school rules, peer relationships, and teacher relationships at school<sup>16</sup>.

The School Learning subscale measures how much the child is interested in learning. The School Rules subscale measures how well the child follows classroom rules and responsibilities. The Peer Relationships subscale measures how well the child has a good relationship with peers. The Teacher Relationships subscale measures how well the child has a good relationship with their teacher. Each subscale consisted of 5 items. All items were assessed on a four-point scale. The Cronbach's  $\alpha$  in the 5th grade was 0.94.

**C. Data Analysis**

Descriptive statistics examined means and SDs of school adjustment rated by children. To determine the differences in children's school adjustment by gender and across grade, several repeated measure ANOVAs (Analysis of Variance) were used.

The collected data were analyzed with the Statistical Package for the Social Sciences (SPSS) (version 18.0, Inc., Chicago, IL, USA).

**III. RESULTS**

**A. General Characteristics**

The characteristics of the participants from 1st grade through 5th grade are shown in Table 1. Of the participants, 51.4% were boys and 48.6% were girls.

The mean age of the participants in 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade was 5.98 (SD=.18), 6.98 (SD=.17), 7.98 (SD=.15), 8.98 (SD=.15), 9.98 (SD=.15) years each. The perceived economic status in 5<sup>th</sup> grade was distributed as follows: Very rich, 11.4%; Rich, 32.0%; A little rich, 15.5%; Average, 38.3%; A little poor, 2.2%; Poor, 0.5%, very poor, 0%. Health status, perceived by children in 5<sup>th</sup> grade is distributed as follows: Very good, 40.9%; good, 56.0 %; bad, 3.0%; very bad, .1%.

Table 1: General Characteristics(N=2110)

Variable	Category	n(%), Mean±SD				
		1st	2nd	3rd	4th	5th
Gender	Boys	1,084(51.4%)				
	Girls	1,026(48.6%)				
Age		5.98±.18	6.98±.17	7.98±.15	8.98±.15	9.98±.15
Height		-	130.29± 6.25 cm	135.65±6.37 cm	141.36±6.68cm	152.34±58.86 cm
Weight		-	28.71±5.64 kg	32.49±6.71 kg	36.15±7.46 kg	45.42±16.63 kg
Subjective Economic status	Very rich	-	-	-	-	241(11.4)
	Rich	-	-	-	-	676(32.0)
	A little rich	-	-	-	-	326(15.5)
	Average	-	-	-	-	809(38.3)
	A little poor	-	-	-	-	47(2.2)
	Poor	-	-	-	-	10(.5)
Health status	Very good	515(24.4)	593(25.4)	640(29.6)	919(43.4)	863(40.9)
	good	1504(64.2)	1573(67.2)	1450(67.0)	1143(53.9)	1181(56.0)
	bad	91(4.3)	76(3.4)	71(3.3)	51(2.4)	63(3.0)
	very bad	-	6(.3)	3(.1)	6(.3)	3(.1)

**B. Descriptive Statistics for Variables**

Descriptive statistics for school adjustment and its subscales (from the 1<sup>st</sup> through 5<sup>th</sup> grades) are shown in Table 2. The level of school adjustment subscale in the 1<sup>st</sup> grade was 2.91-3.62 (ranging 1-4); the mean of teacher relationships was the highest (3.62±.46) and the mean of peer relationships was the lowest (2.91±.38). The level of school adjustment subscale in the 2<sup>nd</sup> grade was 2.83-3.49 (ranging 1-4); the mean of teacher relationships was the highest (3.49±.50) and the mean of peer relationships was the lowest (2.83±.34). The level of school adjustment subscale in the 3<sup>rd</sup> grade was 2.83-3.42 (ranging 1-4); the mean of teacher relationships was the highest (3.42±.52) and the mean of peer relationships was the lowest (2.83±.31). The level of school adjustment subscale in the 4<sup>th</sup> grade was 2.92-3.29 (ranging 1-4); the mean of

school rule was the highest (3.29±.52) and the mean of peer relationships was the lowest (2.92±.34). The level of school adjustment subscale in the 5<sup>th</sup> grade was 2.93-3.23 (ranging 1-4); the mean of teacher relationships was the highest (3.23±.61) and the mean of peer relationships was the lowest (2.93±.31). The level of adjustment in the 1<sup>st</sup> grade was the highest and the level of adjustment in the 5<sup>th</sup> grade was the lowest.

Table 2: Mean and SD of School Adjustment in 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> Grade

Variable	Category	Mean±SD
1st	school learning	3.26±.45
	school rule	3.56±.40
	peer relationship	2.91±.38
	teacher relationship	3.62±.46
	total	3.34±.33
2nd	school learning	3.15±.43
	school rule	3.43±.43
	peer relationship	2.83±.34
	teacher relationship	3.49±.50
	total	3.23±.33
3rd	school learning	3.09±.43
	school rule	3.35±.43
	peer relationship	2.83±.31
	teacher relationship	3.42±.52
	total	3.18±.33
4th	school learning	3.19±.51
	school rule	3.29±.52
	peer relationship	2.92±.34
	teacher relationship	3.27±.63
	total	3.17±.41
5th	school learning	3.14±.50
	school rule	3.19±.49
	peer relationship	2.93±.31
	teacher relationship	3.23±.61
	total	3.12±.38

**C. School Adjustment Change by Gender and Time**

To determine the developmental changes in school adjustment Repeated Measure ANOVAs with the five-time points as within-subject factors and gender as a between-subject factor was used.

**School Learning Adjustment by Gender and Time**

Means and SDs for school learning adjustment from the 1<sup>st</sup> through 5<sup>th</sup> grades are shown in Table 3. The results of ANOVA with repeated measure revealed significant main and interaction effects for gender and time (See table 4). The results of ANOVA with repeated measure showed significant main effects of time ( $F=42.68, p<.001$ ) and gender ( $F=24.27, p<.001$ ) on the school learning adjustment. Also, a significant effect was found for the interaction between time and gender ( $F=15.12, p<.001$ ) (See Figure 1). Post hoc analysis indicated that boys and girls showed a significant difference in school learning adjustment in the 1<sup>st</sup> ( $t=-9.62, p<.001$ ) and 5<sup>th</sup> grade ( $t=-2.38, p<.05$ ); however, there was no significant difference between boys and girls in school learning adjustment at the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> grade.

Table 3: The Developmental Changes in School Learning Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

Variable	Category	Mean±SD	
		Boys	Girls
school learning	1st	3.17±.49	3.35±.39
	2nd	3.14±.43	3.15±.43
	3rd	3.09±.43	3.09±.43
	4th	3.18±.52	3.21±.50
	5th	3.11±.52	3.16±.49

Table 4: The Developmental Changes in School Learning Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

source	SS	df	MS	F
Within				
time	31.72	3.34	9.49	42.68***
time * gender	11.24	3.34	3.36	15.12***
error	1384.41	6229.84	.22	
Between				
gender	8.20	1	8.20	24.27***
error	629.43	1863	.34	

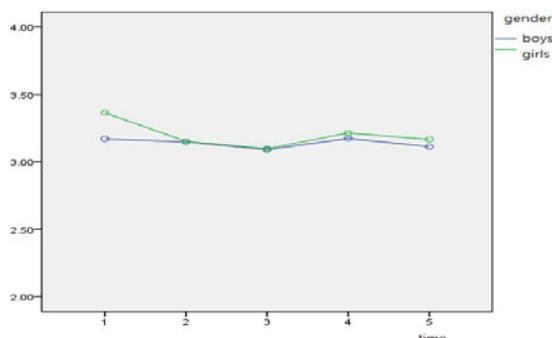


Figure 1: The Developmental Changes in School Learning Adjustment by Gender

**School Rules Adjustment by Gender and Time**

Means and SDs for school learning adjustment from the 1<sup>st</sup> through 5<sup>th</sup> grades are shown in Table 5. The results of ANOVA with repeated measure revealed significant main and interaction effects for gender and time (See table 6). The results of ANOVA with repeated measure showed significant main effects of time ( $F=200.02, p<.001$ ) and gender ( $F=21.25, p<.001$ ) on school rule adjustment. Also, a significant effect was found for the interaction between time and gender ( $F=11.46, p<.001$ ) (See Figure 2). Post hoc analysis indicated that boys and girls showed a significant difference in a school rule adjustment in the 1<sup>st</sup> ( $t=-8.90, p<.001$ ) and 5<sup>th</sup> grade ( $t=-3.81, p<.001$ ); however, there was not significant difference between boys and girls in school rule adjustment at the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> grade.

Table 5: The Developmental Changes in School Rule Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

Variable	Category	Mean±SD	
		Boys	Girls
school rule	1st	3.48±.44	3.64±.34
	2nd	3.43±.43	3.44±.43
	3rd	3.37±.42	3.34±.42
	4th	3.28±.52	3.30±.52
	5th	3.15±.51	3.23±.47

Table 6: The Developmental Changes in School Rule Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

source	SS	df	MS	F
Within				
time	145.56	3.48	41.89	200.02***
time * gender	8.34	3.48	2.40	11.46***
error	1355.80	6473.77	.21	
Between				
gender	6.39	1	6.39	21.25***
error	560.15	1863	.30	

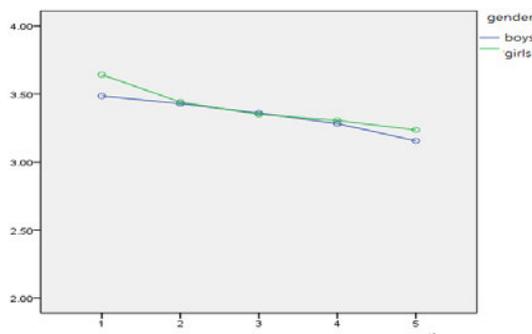


Figure 2: The Developmental Changes in School Rule Adjustment by Gender

**Peer Relationship Adjustment by Gender and Time**

Means and SDs for school learning adjustment from the 1<sup>st</sup> through 5<sup>th</sup> grades are shown in Table 7. The results of ANOVA with repeated measure revealed significant main and interaction effects for gender and time (See table 8). The results of ANOVA with repeated measure showed significant main effects of time ( $F=43.97, p<.001$ ) and gender ( $F=18.76, p<.001$ ) on peer relationship adjustment. Also, a significant effect was found for the interaction between time and gender ( $F=11.16, p<.001$ ) (See Figure 3). Post hoc analysis indicated that boys and girls showed a significant difference in a peer relationship adjustment in the 1<sup>st</sup> ( $t=-7.42, p<.001$ ); however, there was not a significant difference between boys and girls in peer relationship adjustment at the 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade.

Table 7: The Developmental Changes in Peer Relationship Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

Variable	Category	Mean±SD	
		Boys	Girls
peer relationship	1st	2.85±.40	2.97±.34
	2nd	2.83±.34	2.84±.34
	3rd	2.84±.31	2.83±.32
	4th	2.92±.35	2.93±.34
	5th	2.92±.32	2.94±.29

Table 8: The Developmental Changes in Peer Relationship Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

source	SS	df	MS	F
Within				
time	17.42	3.44	5.07	43.97***
time * gender	4.42	3.44	1.29	11.16***
error	738.24	6405.49	.12	
Between				
gender	3.11	1	3.11	18.76***
error	308.74	1863	.17	

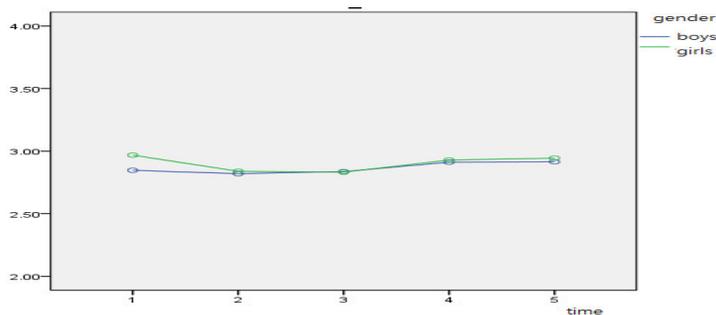


Figure 3: The Developmental Changes in Peer Relationship Adjustment by Gender

**Teacher Relationship Adjustment by Gender and Time**

Means and SDs for school learning adjustment from the 1<sup>st</sup> through 5<sup>th</sup> grades are shown in Table 9. The results of ANOVA with repeated measure revealed significant main and interaction effects for gender and time (See table 10). The results of ANOVA with repeated measure showed significant main effects of time ( $F=187.25, p<.001$ ) and gender ( $F=25.99, p<.001$ ) on teacher relationship adjustment. Also, a significant effect was found for the interaction between time and gender ( $F=13.56, p<.001$ ) (See Figure 4). Post hoc analysis indicated that boys and girls showed a significant difference in teacher relationship adjustment in the 1<sup>st</sup> ( $t=-11.14, p<.001$ ) and 5<sup>th</sup> grade ( $t=-2.68, p<.01$ ); however, there was not significant difference between boys and girls in teacher relationship adjustment at the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> grade.

Table 9: The Developmental Changes in Teacher Relationship Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

Variable	Category	Mean±SD	
		Boys	Girls
teacher relationship	1st	3.52±.52	3.73±.36
	2nd	3.49±.50	3.50±.50
	3rd	3.43±.52	3.40±.54
	4th	3.25±.63	3.30±.63
	5th	3.20±.58	3.27±.61

Table 10: The Developmental Changes in Teacher Relationship Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

source	SS	df	MS	F
Within				
time	199.80	3.57	55.91	187.25***
time * gender	14.47	3.57	4.05	13.56***
error	1986.81	6654.73	.30	
Between				
gender	10.72	1	10.72	25.99***
error	767.68	1862	.41	

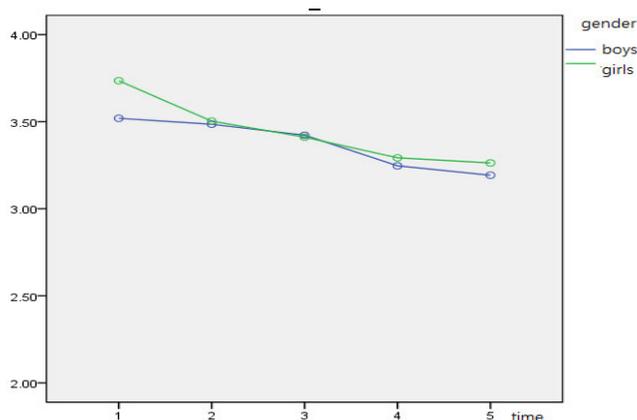


Figure 4: The Developmental Changes in Teacher Relationship Adjustment by Gender

**Total School Adjustment by Gender and Time**

Means and SDs for school learning adjustment from the 1<sup>st</sup> through 5<sup>th</sup> grades are shown in Table 11. The results of ANOVA with repeated measure revealed significant main and interaction effects for gender and time (See table 12). The results of ANOVA with repeated measure showed significant main effects of time ( $F=122.26, p<.001$ ) and gender ( $F=32.87, p<.001$ ) on the total school learning adjustment. Also, a significant effect was found for the interaction between time and gender for total school adjustment ( $F=21.29, p<.001$ ) (See Figure 5). Post hoc analysis indicated that boys and girls showed a significant difference in total school adjustment at the 1<sup>st</sup> ( $t=-11.96, p<.001$ ) and 5<sup>th</sup> grade ( $t=-3.41, p<.01$ ); however, there was not significant difference between boys and girls in total school adjustment at the 2<sup>nd</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> grade.

Table 11: The Developmental Changes in Total School Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

Variable	Category	Mean±SD	
		Boys	Girls
Total school adjustment	1st	3.26±.37	3.42±.27
	2nd	3.22±.33	3.23±.33
	3rd	3.18±.33	3.17±.34
	4th	3.16±.42	3.18±.49
	5th	3.09±.39	3.14±.37

Table 12: The Developmental Changes in Total School Adjustment in 1<sup>st</sup> and 5<sup>th</sup> Grade and by Gender

source	SS	df	MS	F
Within				
time	52.10	3.24	16.07	122.26***
time * gender	9.07	3.24	2.80	21.29***
error	793.86	6040.13	.13	
Between				
gender	6.78	1	6.78	32.87***
error	384.30	1863	.21	

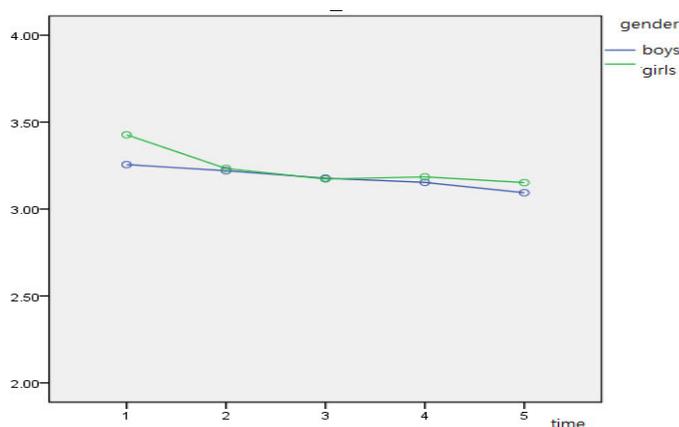


Figure 5: The Developmental Changes in Total School Adjustment by Gender

#### IV. DISCUSSION

This study examined the trend of developmental change on school adjustment during elementary school and explored possible differences in school adjustment by gender across the year. Examining school adjustment perceived by children may be important in understanding their academic achievement and psychological well-being and in predicting children’s positive outcome. Considering that children’s various experiences at school can affect their outcome both positively and negatively<sup>6,7</sup>, it is important to promote the level of children’s school adjustment.

First, the results indicated that children’s school adjustment and its subscale varied across years and across different domains. The level of total school adjustment in the 1st grade is the highest; however, the level of total school adjustment in the 5th grade is the lowest. The decline of school adjustment may reflect the developmental characteristics, while the physical and psychological changes that children encounter at puberty may bring about adjustment difficulty. Girls begin puberty at about ages 10–11 and boys about ages 11–12; however, puberty has started earlier recently<sup>17</sup>. As children face developmental needs, including a heightened autonomy and self-identification and intimate relationship with peers in middle childhood<sup>18</sup>, children are likely to experience adaptation difficulties in school life. For this reason, understanding the children’s developmental needs is the prerequisite to improving the school adjustment at the transition period of puberty.

Also, the result regarding adjustment to a different domain of school life was interesting. Among the subscales of school adjustment, the level of adaptation to teacher relationship was the highest from the 1<sup>st</sup> grade through 5<sup>th</sup> grade. It is fortunate children perceive themselves as having a good relationship with their teacher. A positive relationship with a school teacher has been found to be a powerful predictor of children's school success<sup>8,19</sup>. The children who had an intimate relationship with their teacher in the 1<sup>st</sup> grade showed better academic achievement and less problematic behavior<sup>2</sup>. The positive relationship between child and teacher may operate as a secure base for children and, for this reason, children can actively participate and enjoy school life. This result suggested the importance of positive teacher-child relationship in school. However, the level of adaptation to peer relationship was the lowest from the 1<sup>st</sup> grade through 5<sup>th</sup> grade. Many children have difficulty in making and maintaining a good relationship with peers after entering elementary school. Though social skill and emotional competence are essential to creating a peer relationship, young children still lack this competence. Considering peer relationship was the key factor of school adjustment<sup>20,21</sup>, the intervention or program to improve children's peer relationship was provided to school children.

Second, the results of this study found differential changes by gender in school adjustment across grades. There was a significant interaction effect of time by gender, as well as main effects of time and gender on school learning adjustment and its subscales. Regarding the gender difference, girls better adjusted themselves to school life than boys. Consistent with the previous study of gender differences in school adjustment, girls reported a significantly higher level of adjustment to school than did boys<sup>22, 23</sup>. Regarding time difference, there was a significant difference in total school adjustment and its subscales across times. Except for adjustment to peer relationship, adjustment to school learning, school rule, and teacher adjustment declined from the 1<sup>st</sup> through 5<sup>th</sup> grade. Previous studies on Korea's education system indicated the problem of overachieving students who carried the burden of academic success. Korea's education fever, as already well-known, makes children stressed out and depressed. For these reasons, it is more difficult for children to adapt to and enjoy their school life as they grow up.

Also, there was a significant interaction effect across time by gender. Concerning school learning adjustment, school rule adjustment, and teacher relationship adjustment, girls got higher scores than boys at the 1<sup>st</sup> and 5<sup>th</sup> grades, whereas the score of girls was significantly different from those of boys in the 2<sup>nd</sup> through 4<sup>th</sup> grade. Girls adapted to school learning and school rules better than boys and made a better relationship with their teacher than boys at the 1<sup>st</sup> and 5<sup>th</sup> grades. These results were in line with the difficulty of boy's adjustment to the transition period<sup>22</sup>. Therefore, more sensitive care and guidance were provided for boys to foster school adjustment. Concerning peer relationship adjustment, the girls showed higher adaptation to peers than boys only in the 1<sup>st</sup> grade. For boys, peer adjustment gradually increased across time; however, for girls, peer adjustment changed across time. Though girls were better at making positive relationships and sympathy for others<sup>24</sup>, girls at puberty often experienced hardship caused by interpersonal relationships. Therefore, the developmental approach is considered to promote boys' and girls' peer adjustment.

Understanding the developmental changes of children's school adjustment in Korea is important because children's school adjustment is related to children's current and future outcomes. This study showed the changes in school adjustment over time and by gender with longitudinal design. These results confirmed the need for the differentiated approach to enhance boys' and girls' school adjustment according to their grade. However, this study couldn't explore the cause of differential adjustment across time and gender. Future longitudinal study on school adjustment should include the antecedents and consequence of school adjustment. Studies exploring specific processes that link earlier school adjustment with later school adjustment across the transition period are also needed.

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# The Effect of Flipped Learning Based Instruction in Creativity·Personality Education of Preliminary Teachers

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## Abstract---

**Background/Objectives:** This study aims to analyze the effects of application classes based on Flipped Learning for strengthening capability of Creativity. Personality Education in the course of teacher training in the university.

**Methods/Statistical analysis:** For this study, it was conducted the before and after surveys on Flipped Learning based class covering 112 students attending 'Educational Method and Technology' course in university A in Daejeon. Creativity & personality diagnostic tool was used to measure creativity & personality capability which is categorized mainly as creativity, personality and creativity & personality teaching efficacy.

**Findings:** This study has proven the effects of Flipped Learning aiming to improve preliminary instructor's creativity & personality educational capabilities. According to the results, it is effective first of all to lead the students to study the material online ahead, and then lead them to various actual activities aiming to increase the creativity & personality educational capability in order to improve the creativity, personality and the creativity & personality teaching efficacy of the preliminary instructor. First, it is critical to induce perception shifts of preliminary instructors regarding curricula for teaching profession. Second, change in the operation of university curricula for teaching is required alongside the change of perception of the instructors. Third, to design a constructive activity for enhancing creativity & personality capabilities, a foundation system is required to actually put the ideas in practice.

**Improvements/Applications:** It need to work on a teaching process that aims to enhance Creativity. Personality capability on various subjects as well as to focus on the theories of curricula for teaching.

**Keywords---** University Education, Flipped Learning, Preliminary Teacher, Creativity, Personality.

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## **I. INTRODUCTION**

### **A. *The Study's Background and Purpose***

Along with the rapid development of science technology and its internationalization, our society entered into the Creative society that creates higher value-added information from existing information and knowledge in creativity<sup>1</sup>.

In the Creative society it requires high level of knowledge, talents with creativity, social diversity, deepened internationalization, and any others. To lead a society emphasizing creation of information, technology, and culture by raising creative human resources, roles and paradigm of education also need to transform themselves to be open, diversified, liberalized, and individualized. In Korea, Creativity. Personality Education was introduced since the revised education curriculum promulgated in 2009. Particularly, Personality Education Promotion Act, came into effect on July 21th, 2015, given a high responsibility to the school principal to plan and implement the school's own personality education plan, so that educational capabilities that could build not only students' creativity but also their personality are required. According to this, a preliminary teacher who is in the course of teaching training has to be prepared for planning and implementing Creativity. Personality Education.

Creativity. Personality Education, that is an education to foster Creativity. Personality that needed for raising global talented persons for the 21<sup>st</sup> century, refers to educational philosophy and strategy to build a personality which fosters development and demonstration of one's creativity, socio cultural value and climate and to raise creative person possessing right personality and moral judgment by emphasizing the capacity and role of Creativity. Personality Education and organic unification of both educations at the same time<sup>4</sup>. Actually in the past, education focused on enhancing the cognitive ability with creativity as the core value, but a new educational paradigm that combines and creates definitive capability and personality with emphasis at the same time emerged as the current trend.

In addition, as a newer trend, many researchers agree that school education has to cultivate the personality and talent for living together with one's neighbors and to engage to moral development and personality formation<sup>2</sup>.

A capability of a preliminary teacher for Creativity. Personality Education could be acquired by a new teaching-learning activity in a course for teacher training. Therefore, it is needed to seek for the substance of Creativity. Personality Education and ways to develop it in the process of managing a course for teacher training. Thus, it is important to prepare a way of teaching preliminary teachers to fulfill curriculum purpose and develop a capacity for Creativity. Personality Education at the same time in the course of raising preliminary teachers. To do this, first of all, it is recommendable to find and apply a teaching-learning way that is able to manage effectively a course based on Creativity. Personality Education. In the recent days, Flipped Learning is emphasized for strengthening self-initiative learning of college learners. Flipped Learning, being different from a conventional teaching way that a lecture is given by instructors to help perform individual or team assignments, refers to a course process proceeding more deepened teaching-learning activity in the face-to-face class after conducting pre-learning course using online contents previewing the actual class. A role of instructor as a knowledge-conveyer is altered by using technology, and a lecture model that urges students to solve difficult and complex problems through immediate interactions with their instructor and classmates is suggested in earnest<sup>3</sup>.

This study aims to analyze the effects of application classes based on Flipped Learning for strengthening capability of Creativity.

Personality Education in the course of teacher training in the university and look for the ways to strengthen capability of Creativity. Personality Education of the preliminary teachers with respect to the analyzed effects.

### **B. *Questions of the Study***

The questions of the study are as follow:

First, does the creativity of preliminary teachers improve in the courses based on Flipped Learning?

Second, does the personality of preliminary teachers improve in the courses based on Flipped Learning?

Third, does the Creativity. Personality teaching-learning efficiency of preliminary teachers improve in the courses based on Flipped Learning?

## II. THEORETICAL BACKGROUNDS

### A. Creativity·Personality Education in Universities

Creativity. Personality Education, which is for raising creativity and personality at the same time, refers to educational philosophy and strategy for raising a creative person possessing right personality and moral judgment by emphasizing independent function and role of Creativity Personality Education and organic unification of both educations<sup>4</sup>. Alongside the recent trend, it emphasizes that a person needs to obtain not only creativity but also right personality and communication skills in a cooperative relationship within an organization, and two mutually independent factors, creativity and personality, have been combined into Creativity·Personality<sup>5</sup>. Core factors of Creativity·Personality Education according to previous researches are shown as in the following <Table 1><sup>6, 7, 8, 9</sup>.

Table 1: Consideration of the Essential Parts of Creativity·Personality Education

Category	Factor	Specific Factor	Choi et al. (2009)	Moon & Choi (2010)	Kim (2010)	Jung (2011)	Park (2012)	Park (2012)
Creativity	Cognitive Factor	Divergent Thinking	○	○	○	○	○	○
		Visualization		○			○	
		Metaphorical Thinking	○	○	○	○	○	
		Logical Thinking		○			○	
		Critical Thinking		○		○	○	
		Problem Finding		○			○	○
		Problem Solving		○			○	○
	Dispositional Factor	Courage			○			
		Autonomy		○				
		Originality	○	○	○	○	○	
		Diversity	○	○				
		Complex Personality		○				
		Tolerance of ambiguity		○				○
		Sensitivity		○	○			
	Motivational Factor	Curiosity		○			○	
Flow			○			○		
Personality	Virtue of Human Relations	Honesty		○	○	○	○	
		Keeping Promise		○	○	○	○	
		Forgiveness		○	○		○	
		Sense of Responsibility		○	○		○	
		Solicitude	○	○	○	○	○	
		Possession	○	○	○			
	Personality Judgment Capacity	Moral Sensitivity		○				
		Moral Judgment	○	○				○
		Decision Making	○	○			○	○
		Practical Action	○	○			○	

These characteristic features of Creativity·Personality Education can be categorized into generalness, extensivity, future-directivity, and simultaneity. Generalness refers to an education conducted every day for every student, requiring evolution from self-understanding into creative solving of general problems such as interest to others, attentiveness and environment. Extensivity does not suggest that the Creativity·Personality Education should be performed in several courses or activities but that a talent fostering or education should be developed from infancy through school courses, creative experiences, and home educations so that the education requires active development and effort by utilizing diverse material, personal recourses and external and internal means of school. Future-directivity indicates a future-oriented education giving positive images such as 'joy, myself, important' and simultaneity suggests an education to raise creativity and personality at the same time.

Considering the previous studies on development of Creativity·Personality Education in universities, it has been reported that the creative capacity won relatively low score as a result of checking out creativity and personality capacity after reorganizing factors of Creativity·Personality capacity of preliminary elementary school teachers<sup>10</sup>. Also, in the result of effectiveness verification of Creativity·Personality Education program, psychological stability factor is shown to be the most effective, while no much effectiveness was shown in the factors such as Sympathy·Catholicity, Volunteering·Sacrifice·Cooperation, Knowledge·Information ability. The reference <sup>11</sup> examined Creativity·Personality Education program for students of College of Education and in its result, creativity of the experimental group rose significantly as compared to the control group, while no significant result was noticed in personality. Meanwhile, a study<sup>12</sup> examined Creativity·Personality Education program for preliminary infant teachers and in its result, the program affects improvement the Creativity·Personality ability. This suggests that Creativity·Personality ability has to be considered importantly in college lectures for which it is needed to find an effective teaching planning methodology.

### ***B. Considering Flipped Learning***

Flipped Learning, having been used at first by Jonathan Bergmann and Aron Sams, refers to a flipped teaching method that prescribed conservative lecture-centered activity in school and assignment in home in advance. In other words, it means that knowledge is learned before the classroom lecture through lecture materials or lecture video, and students analyze, utilize, and use the learned knowledge to integrate in classroom<sup>13</sup>. This Flipped Learning is emphasized because it is regarded as a way to resolve problems by using both diverse teaching-learning methods based on cooperative learning and traditional lecture-centered teaching which assists in acquisition of Creativity·Personality, critical thinking, problem-solving ability, cooperative learning ability and any other higher knowledge acquisition, aiming at a perfect learning, class materials sharing before the class to secure activity hours in classroom and collective problem solving in classroom<sup>13</sup>.

The appearance of class will depend on how an instructor manages Flipped Classroom; Bergmann and Sams suggests that instructors need the following preparations for successful utilization of Flipped Learning. First, instructor's communication matters. Flipped learning is a re-organization of the existing teaching methods that have been performed basically. It is difficult, however, for the instructor to reorganize his or her class execution by his or herself with ensuring objectivity. Class reorganization through communication and cooperation among instructors on- and off-line would help evolve from teacher's own class to class based on Flipped Learning. Second, learner-centered learning circumstance has to be made. Particularly, teaching contents and circumstance would be better if they are selected in consideration of learner's requirements and opinions than those the instructor chooses by him or herself. That is why listening learner's opinions using requirement survey before class and setting a learning goal according their opinions would be of help. Third, an optimized learning space has to be provided. Existing classrooms' physical design is not optimized for Flipped Learning class. Thus, the instructor has to maximize effectiveness of the class by adapting classroom circumstance to the planned Flipped Learning strategy. Also, online learning space should be organized based upon the learners' situations such as accessibility, utility, and ease. Fourth, a support from IT department should be accompanied. It is out of control of the instructor, but it is hard for the instructor him or herself to prepare planned learning space and required materials. Particularly, if a technological support like organizing space for online preparation learning is provided by relevant departments, Flipped Learning would be performed more smoothly. Hereafter, based on these supports, it is able to extend to a platform that can provide service by managing accumulated data in general. Fifth, enough time for conducting and utilizing should be allowed. Enough time for merging smoothly into the class is needed no matter how a new teaching-

learning strategy is conducted, and it requires reviews through feedbacks from instructors, learners, and colleague teachers<sup>14</sup>.

Characteristic features of Flipped Learning will be categorized as follow as compared to traditional classroom environment<sup>15</sup>. First, students change from passive lecture-takers listening to the lecture into active learners conducting prerequisite learning. Second, the class is altered to a form that a learner takes a prerequisite learning by him or herself and in an actual class he or she is able to proceed with individualized class based on his or her learned contents and level. Third, class time becomes a utilization time for higher level problem-solving. They can conduct additional learning when the prerequisite learning is insufficient and they can conduct in-depth study supported by instructors when the prerequisite learning is enough.

In Flipped Learning, the instructor's role is very important and the instructor has to be professional to provide an appropriate level of learning content and process for the learner<sup>20</sup>. Flipped Learning can be characterized by four main ideas: a flexible environment, learning culture, intended learning content and a professional instructor<sup>17</sup>. First, a flexible environment includes rearranging the physical learning space in relation to the various learning methods applied with Flipped Learning. Second, learning culture implies that the instructors, unlike their traditional roles, take the position of an assistant and actively participate in the knowledge acquiring process of the learner in the pace of the learner. Third, intended learning content means that before class, learners study a material for concept acquisition, and aiming for the maximization of the effect of class learning. Fourth, a professional instructor doesn't mean that the instructor's role disappears in Flipped Learning, but that the role of a professionally trained instructor is more important in the overall process of learning.

Previous studies about the effectiveness of Flipped Learning, in the case where Flipped Learning was applied in university courses, searched for educational applicability based on the investigation of awareness of the attending and preliminary instructor<sup>18</sup> and it was also reported that it counts the learner and instructor's levels of awareness and academic achievements<sup>19, 20, 21</sup>. Particularly, in class learning, it seemed that cooperative project based learning increased the learners' knowledge application and cooperation abilities and therefore led a positive relationship proved in the satisfaction level tests<sup>22, 23, 24</sup>. It was also reported that increasing the participation level of learners through Flipped Learning application in university programming courses increased understanding, motivation and self-efficacy of the learners<sup>25</sup>. The reference<sup>22</sup> suggested a teaching and learning design model based on the study of methods to design courses applying Flipped Learning. The reference<sup>11</sup> suggested the teaching and learning design and the requisite elements in preliminary mathematics instructor education. The reference<sup>23</sup> conducted the study by applying Flipped Learning in university courses.

In the study, learners learned the material ahead online and in class, exercised process-focused learning activities and the results showed that the learners experienced more effective academic performance.

Based on the above previous studies, it can be inferred that in designing, applying and generalizing Flipped Learning, there is a need to develop policies and infrastructure before stressing the efforts of individual instructors. Also, the support for environmental improvement is required for the instructor to be able to apply Flipped Learning models with more ease and effectiveness.

Furthermore, the instructor is to search for educational methods to improve Flipped Learning methods (which differ from conventional methods) and to strengthen the effectiveness of Flipped Learning Classroom intended to increase creativity/personality education capabilities in yet unperceived areas of the university curricula for teaching profession.

### **III. METHODOLOGY OF STUDY**

#### **A. Participants**

This study was conducted based on the before and after surveys on Flipped Learning based class with 112 students attending 'Educational Method and Technology' course in university A in Daejeon. Of the students, 50.9% (57 students) were men and 49.1% (55 students) were women.

The students majored in Science & Technology (58%, 65 students), Liberal arts & Sociology (23.2%, 26 students), Language (14.3%, 16 students), Arts & Sports (4.5%, 5 students). The ratio of sophomores was

43.8% (49 students), followed by freshmen who took 24.1% (27 students) of the class. Juniors accounted for 19.6% (22 students) of the class while seniors were 12.5% (14 students) of the class. <Table 2>

Table 2: Information on Participants

Categories		Quantity	Percentage
Sex	Male	57	50.9
	Female	55	49.1
	Total	112	100.0
Major Group	Language & Literature	16	14.3
	Humanity Society	26	23.2
	Science & Engineering	65	58.0
	Art, Music and Physical Education	5	4.5
	Total	112	100.0
Grade	Freshman	27	24.1
	Sophomore	49	43.8
	Junior	22	19.6
	Senior	14	12.5
	Total	112	100.0

### B. Data Collection and Analysis

This study tried to measure the changes in creativity & personality capability of the preliminary instructor to analyze the effects of Flipped Learning based classes. Creativity & personality diagnostic tool was used to measure creativity & personality capability which is categorized mainly as creativity, personality and creativity & personality teaching efficacy. Each question consisted of Likert scale and the higher evaluation means the better capability. For this study, preliminary surveys were conducted on the 1st~2nd week of the semester and the follow-up surveys were conducted on the 15th week.

The 91 questions of the reference<sup>28</sup>'s Self-Report form of Integrative Creativity Scale were adjusted into 77 questions to measure creativity. As the sub-factors of creativity, there were seven questions each about curiosity & interest, patience for ambiguity, complexity, originality, courage, variety, logical & analytical thinking, imagination & visualization capability, divergent thinking, inferred & metaphorical thinking and problem solving. The 60 questions of the reference<sup>29</sup>'s personality scale for university students were adjusted into 47 questions to measure personality. For the sub-factors of personality, four questions were asked about moral acuity, ten about moral judgement, three about decision making, five about power of execution, six about possession, five about honesty, five about solicitude, two about promises and seven about responsibility. To measure creativity & personality, the reference<sup>30</sup> was used. For the sub-factors of teaching efficacy, six questions were asked about perceptions of creativity & personality education, ten about creativity & personality teaching efficacy, 15 about creativity teaching efficacy and 15 about personality teaching efficacy.

In this study, 'IBM SPSS Statistics 22 for Windows' was used to analyze the data. The reliability results were; the reliability coefficient of creativity & personality preliminary survey (Cronbach  $\alpha$ ) was creativity .964, personality .962 and creativity & personality teaching efficacy .932. The reliability coefficient of post-test survey showed a strong relationship with the numbers being; creativity .960, personality .965 and creativity & personality teaching efficacy .938.

## IV. RESEARCH RESULTS AND DISCUSSIONS

### A. Creativity Pre-Post Improvement Level

This study investigated Flipped Learning based classes aiming to reinforce creativity & personality teaching capability of preliminary instructors. The observed creativity pre-post improvement levels are shown in the <table 3>. The results showed a statistically positive increase of all the sub-factors of creativity.

Table 3: Creativity Pre-Post Improvement Level

Creativity sub-factors	Pre-test/Post-test	M	SD	t
Curiosity & Interest	Pre	3.83	0.636	7.251***
	Post	4.02	0.647	
Patience for Ambiguity	Pre	4.37	0.677	7.473***
	Post	4.63	0.643	
Complexity	Pre	3.82	0.646	5.856***
	Post	4.14	0.803	
Originality	Pre	3.71	0.670	5.893***
	Post	3.88	0.681	
Courage	Pre	3.66	0.624	6.734***
	Post	3.83	0.615	
Variety	Pre	4.24	0.731	5.359***
	Post	4.41	0.680	
Logic & Analytical Thinking	Pre	4.37	0.657	7.326***
	Post	4.60	0.653	
Imagination & Visualization Capability	Pre	3.71	0.863	7.149***
	Post	3.95	0.890	
Divergent Thinking	Pre	3.57	0.978	5.482***
	Post	3.77	1.041	
Inferred & Metaphorical Thinking	Pre	3.92	0.612	8.867***
	Post	4.18	0.574	
Problem Solving	Pre	4.10	0.766	7.567***
	Post	4.40	0.750	

N=112, \*\*\*p<.001

**B. Personality Pre-Post Improvement Level**

This study investigated Flipped Learning based classes aiming to reinforce Creativity-Personality teaching capability of preliminary instructors. The observed personality pre-post improvement levels are shown in the <table 4>. The results showed a statistically positive increase of all the sub-factors of personality.

Table 4: Personality Pre-Post Improvement Level

Personality Sub-factors	Pre-test/Post-test	M	SD	t
Moral Acuity	Pre	4.70	0.715	6.934***
	Post	4.99	0.657	
Moral Judgment	Pre	4.55	0.664	5.124***
	Post	4.80	0.614	
Decision Making	Pre	4.56	0.798	3.145**
	Post	4.75	0.833	
Possession	Pre	4.42	0.806	7.193***
	Post	4.68	0.747	
Honesty	Pre	4.81	0.805	4.436***
	Post	4.98	0.785	
Solicitude	Pre	4.83	0.759	2.781**
	Post	5.00	0.767	
Keeping Promises	Pre	4.54	0.881	3.712***
	Post	4.71	0.932	
Sense of Responsibility	Pre	4.34	0.790	6.432***
	Post	4.56	0.766	
Power of Execution	Pre	3.89	0.949	5.026***
	Post	4.09	1.000	

N=112, \*\* p<.01, \*\*\* p<.001

### C. Creativity·Personality Teaching Efficacy pre-Post Improvement Level

This study investigated Flipped Learning based classes aiming to reinforce Creativity·Personality teaching capability of preliminary instructors. The observed Creativity·Personality teaching efficacy pre-post improvement levels are shown in the <table 5>. The results showed a statistically positive increase of all the sub-factors of Creativity & personality teaching efficacy.

Table 5: Creativity·Personality teaching efficacy pre-post improvement level

Creativity sub-factors	Pre-test/Post-test	M	SD	t
Curiosity & Interest	Pre	3.83	0.636	7.251***
	Post	4.02	0.647	
Tolerance of Ambiguity	Pre	4.37	0.677	7.473***
	Post	4.63	0.643	
Complexity	Pre	3.82	0.646	5.856***
	Post	4.14	0.803	
Originality	Pre	3.71	0.670	5.893***
	Post	3.88	0.681	
Courage	Pre	3.66	0.624	6.734***
	Post	3.83	0.615	
Variety	Pre	4.24	0.731	5.359***
	Post	4.41	0.680	
Logic & Analytical Thinking	Pre	4.37	0.657	7.326***
	Post	4.60	0.653	
Imagination & Visualization Capability	Pre	3.71	0.863	7.149***
	Post	3.95	0.890	
Divergent Thinking	Pre	3.57	0.978	5.482***
	Post	3.77	1.041	
Inferred & Metaphorical Thinking	Pre	3.92	0.612	8.867***
	Post	4.18	0.574	
Problem Solving	Pre	4.10	0.766	7.567***
	Post	4.40	0.750	

N=112, \*\*\*p<.001

### V. CONCLUSION AND PROPOSAL

This study has proven the effects of Flipped Learning aiming to improve preliminary instructor's creativity & personality educational capabilities. According to the results, it is effective first of all to lead the students to study the material online ahead, and then lead them to various actual activities aiming to increase the creativity & personality educational capability in order to improve the creativity, personality and the creativity & personality teaching efficacy of the preliminary instructor. Here are the conclusions of this study.

First, it is critical to induce perception shifts of preliminary instructors regarding curricula for teaching profession. There is a significant difference between perceptions of the instructor and the learner over the courses within the curricula. In the case of the instructors, they stress the theoretical aspect of the curricula based on the studies they conducted for years. On the other hand, the learners tend to have no specific expectations on the courses and often perceive the courses as boring. In this study, Flipped Learning was applied in all classes of 'Educational Method and Technology' course of University A using standard common contents. Contrary to the previous perception of learners that curricula is not much important, this study showed that the learners' perceptions change positively with their active participation in the new ways of teaching, the utilization of common contents at the level of the whole department and the connected activities with the actual on-site instructors.

Second, change in the operation of university curricula for teaching is required alongside the change of perception of the instructors. Before anything else, a practical and substantial teaching process needs to be applied to enhance the capabilities required for the instructors at elementary and middle schools. For this, the instructor should build a system that aims to link the curricula to the actual on-site education which has the purpose of reflecting the capabilities required for the on-site instructors. In a curriculum for teaching that tries to foster competent future instructors, it is critical to run a teaching program that grows capabilities required when teaching learners on site. To achieve this, before we fix the overall curricula as a whole, it is important that each instructor realizes the significance of a teaching activity based on a deep understanding

of elementary and middle school teaching sites since the capability of the instructor is a crucial variable that affects the quality of the class.

Third, to design a constructive activity for enhancing creativity & personality capabilities, a foundation system is required to actually put the ideas in practice. The most urgent matter is to form a university level educational environment which allows various teaching-learning activities to enhance the creativity & personality capabilities of preliminary instructors. Furthermore, it is necessary to build a cooperation system with existing schools using the resources of the university. Consistent efforts to widen the mutual understanding of on-site schools and the university are required to grow instructors who fully understand the various changes on-site and who can aptly react to the changes.

Based on this study, subsequent studies need to work on a teaching process that aims to enhance creativity & personality capability on various subjects as well as to focus on the theories of curricula for teaching. Furthermore, for this, both quantitative and qualitative studies are required to analyze the empirical and mental processes of a preliminary instructor becoming an on-site instructor as well as to continuously search for methods to constantly support the processes.

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## Improving the Dementia Benefits in Korean Long Term Care Insurance

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### Abstract---

**Background/Objectives:** Due to the advent of an aging society, elderly dementia population in Korea is continuously increasing and the social economical burden is increasing. This study analysis the pilot project and institutional support for dementia patients in long-term care insurance in Korea. And for the effective and continuous dementia benefit support analysis also the status of dementia patient support in Germany.

**Methods:** The study reviews dementia benefits in Korea and Germany through research studies, related laws and literature materials. The study explored the long-term care dementia benefit related system operation status in Korea and dementia related benefit system status and dementia policy trends in Germany to derive policy implications.

**Findings:** Introduction of dementia benefit in long-term care insurance in Korea is contributing to the improvement of quality of life in elderly with dementia and families through subject expansion and cognitive ability improvement. Along with mild dementia patients, now the benefit provision is progressively expanding to severe dementia patients and their families. In case of Germany, benefit improvement for dementia patient support has progressively expanded since 2002 until current day. Medium and long-term policy activation plan is necessary for care benefits for dementia patients in early stages to be effectively and continuously provided. There needs to be continuous expansion of support subjects according to increase in elderly dementia, expansion of home support service with cognitive function recovery program currently provided, expansion of useful day and night care center other than home benefits, and promotion and plan establishment for activation. In terms of medium and long-term, there needs to be establishment of plans to establish integrated care provision system for elderly with dementia and families and at the same time, it is necessary to establish plans for the family support such as family care workers.

**Improvements/Applications:** To establish plans to activate medium and long-term dementia benefits, policy case studies on various preceding nations and research and analysis on cognitive and physical changes in recipients should be continuously conducted.

**Keywords---** Long-term Care Insurance, Dementia Care, Special Dementia Level, Long-Term Care Concept, Day and Night Care, Integrated Dementia Support.

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## **I. THE NEED FOR INTRODUCTION OF DEMENTIA RATING**

The number of dementia patients over 65 year in Korea in 2012 was around 530,000 and prevalence of dementia was 9.1%. Due to rapid aging of society, it is expected that dementia patients will increase twofold from around 1.22 million in 2030 to around 2.38 million in 2050. <sup>1</sup> This increase in dementia patients increases not only the burden of the elderly dementia patient and family but also significant socio-economical costs. <sup>2</sup> According to Health Insurance Review and Assessment Service, number of people receiving dementia care increased from 295,000 people in 2011 to 459,000 people in 2015 and the number of dementia patients increased by yearly average of 11.7%. Total dementia care costs also increased by 763.0 billion KRW from 865.5 billion to 1628.5 billion. In 2050 when dementia patients will increase to 2.71 million people, it is predicted that social costs related to dementia will reach 43 trillion KRW which accounts for 1.5% of the GDP. The essential characteristic of dementia is the continuous damage to emotional activity ability. In the early stages there are short-term memory disabilities and cognitive disabilities, and as time passes, cognitive ability degrades and causes significant difficulty in daily life. Therefore, it is necessary to support the improvement of quality of life in dementia patients and family through mitigating progression of dementia and symptoms through combination of early detection and medical and nonmedical measures. <sup>3</sup>

To respond to the severe increase in elderly with dementia, from July 2014, mild dementia patients were given long-term care rating 5 (special dementia rating) in the long-term care insurance to provide long-term care benefits. Because mild dementia patients had relatively satisfactory physical function even with limitations in daily life, and it was difficult to recognize care rating and the necessity for dementia related care and if it provision was emphasized. However, only around 180,000 elderly with severe dementia who have severe difficulties in movement due to cerebrovascular disease or severe dementia can receive long-term care insurance benefits. However, there is no provision of specialized dementia related programs. To satisfy this dementia related support needs, it is necessary for long-term care insurance to introduce special dementia rating to provide specialized institutional dementia support plans not only for mild dementia patients but also severe dementia patients. The study will explore the status of dementia patient support through long-term care insurance and based on the dementia support plans of transcendental nation Germany, tried to suggest a plan for activation of dementia support in Korean long-term care insurance.

## **II. DEMENTIA SUPPORT IN KOREAN LONG TERM CARE INSURANCE**

### ***Pilot Project for Dementia Rating***

The pilot project for introduction of special dementia rating started in September 2013 was conducted in a total of six regions including two regions each of large cities, medium-sized cities, and small regions. Applicable subjects were elderly with mild dementia that was not subject to existing care rating and the main purpose is prevention of cognitive function degradation and mitigation of family caregiver burden. Through this, elderly with mild dementia who could not receive long-term care service due to relatively satisfactory physical function are able to receive dementia related long-term care benefits such as cognitive activity programs and visiting care. When approved as a recipient, it is mandatory to utilize the day and night care center or visiting care cognitive training. <sup>4</sup> The day and night care program of the pilot project provides specialized cognitive training programs according to the characteristics of subject and programs by group, small groups, and individuals. In case of cognitive training visiting care, considering the needs and status of the subjects, 1:1 customized benefit is provided and at the level that caregivers can conduct, cognitive training programs, daily life programs, dementia medication management, and dementia family education are conducted.

### ***Dementia Benefits***

Since July 2014, based on the results of the pilot project, long-term care insurance benefits are provided to elderly with mild dementia by introducing special dementia rating (level 5) in long-term care insurance. According to this, among elderly patients with mild dementia who could not receive long-term care benefits due to relatively satisfactory physical function, people who have difficulties in daily life due to cognitive dysfunction and behavioral and psychological symptoms (BPSD) will become the subjects of long-term care benefits. Subjects of special dementia rating are dementia patients with senile disease according to Act on Long-Term Care Insurance for the Aged with approval scores between 45 and 51 and they must submit a physician referral for special dementia rating. Especially, since November 2015, in case of candidates of long-term care rating 5, dementia diagnosis confirmation procedure will be simplified and elderly with

dementia diagnosis and medication history will be able to receive long-term care rating 5 with a general physician referral. The numbers of receivers of special dementia rating in July 2016 were 25,061 and it is in a trend of continuous increase since 1,141 in July 2014.

Table 1: Long-term Care Level Approval Scores

Care level	Scores	
	Max.	Min.
1	100	95
2	Under 95	75
3	Under 75	60
4	Under 60	51
5	Under 51	45

**Special Dementia Rating Benefits**

As shown in table 1, people with special dementia rating 5 can receive necessary dementia related benefits with 15% personal expenses within the range of monthly limit 766,600 KRW. The default provided benefits include cognitive activity programs for preventing degradation of cognitive function and maintenance of remaining capacity and it is provided at visiting care institutions and Day and night care center. Cognitive activity programs are customized programs wondering service provision such as memory training utilizing cognitive training tools such as workbooks and photos, memory improvement activity, instrumental daily life assistance (shopping, cooking, calling etc.), and cognitive function related activities such as program creation by institution managers such as social workers. In case of utilizing visiting care institutions, services are provided more than three times a week or 12 times a month and 2 hours a day, where 1 hour is utilized for cognitive activity program, and 1 hour is utilized for activities for maintenance and improvement of remaining capacity with the recipient. Day and night care center provide cognitive activity programs lasting 8-12 hours a day and according to necessity, weekly washing service and monthly visiting nursing according to visiting nursing directive is provided. Personnel providing cognitive function programs are caregivers that received 80 hours and 19 subjects of special dementia rating related education in case of visiting care, and supervisor such as social workers, occupational therapists, and physiotherapists that received 88 hours and 22 subjects of special dementia education in case of day and night care center. <sup>5</sup> From March 2016, dementia related professional education is being conducted on program supervisors and caregivers including institution directors to strengthen their expertise. In addition, within the limits of 1.6 million KRW a year, they can utilize dementia related care needs within selected items. Items include loitering detectors, canes, adult walkers, wheelchairs, safety groups and anti-slip products.

Table 2: Special Dementia Rating Benefits

<b>Subjects</b>	- Dementia patients with long-term care points between 45 and 51	
<b>Benefits</b>	- Home care	- Cognitive activity program - Service provided more than 3 times a week or 12 times month, 2 hours a day
	- Day and night care	- Cognitive activity program - 8-12 hours a day service - Weekly bath service - Monthly visiting nursing according to visiting nursing directive
	- Welfare equipment	- Selection possible from the designated items
<b>Provided personal</b>	- Home care: Caregivers that received special dementia rating related education - Day and night care institutions: Educated program supervisor	
<b>Costs</b>	- Monthly limit: 766,600 KRW (22 days day and night care, 26 days home care) - Welfare equipment: Yearly limit of 1.6 million KRW - Personal expense: 15% of benefits	

### ***Dementia Family Support***

To support temporary rest for family caring for elderly with dementia at home, dementia family holiday program was introduced in July 2014 where temporary protection services can be used for 15% personal expenses regardless of monthly limitations for six days a year. 24 hour visiting care service was introduced in September 2016 providing daily care services for 24 hours in place of guardians where caregivers visit the home of elderly with severe dementia with long-term care level 1 and 2. In one or more times within the period, nurses (assistants) visit the home in preparation for emergencies.

### ***Dementia Support Expansion***

With the introduction of dementia ratings, for professional provision of dementia related programs to people with other ratings of dementia, dedicated long-term dementia care institution operation has been conducted since July 2016. 66% of facility residents and 77% of day and night care subjects are elderly with dementia and there is a trend of yearly increase. Practically however, there is lack of customized care for patients with dementia. Therefore, dedicated long-term dementia care institutions are additionally being installed to provide customized dementia service to provide stability, maintain cognitive function, and improve problematic behavior in dementia care recipients that have ability for daily life and community life who received long-term care level. The characteristic of dedicated dementia room, dedicated dementia day and night care center, and dedicated dementia community group homes is the provision of an environment by placing small scale living spaces with homely atmosphere where independent living is possible through participating in daily life such as meal preparation with employees and other elderly patients with dementia, alleviating psychological anxiety in elderly dementia patients. For this, program supervisors and caregivers that received professional dementia education are placed to provide service customized to individual elderly patients with dementia. Program supervisors must be one of social worker, nurse or assistant, physiotherapist, or occupational therapist. Program supervisors create provision program plans by recipient every month and conducts caregiver benefit provision monitoring, program provision, monthly recipient family consultation, and creation of management journals. Also from 2016, cognitive activity programs provided only for special dementia rating 5 recipients is expanded to dementia rating 1 to 4 recipients and cognitive activity visiting care service will be expanded from the current two hours a day to three hours (cognitive activity 1 hour + daily life 2 hours) to provide service customized to recipient characteristics.

## **III. LONG TERM CARE INSURANCE DEMENTIA SUPPORT IN GERMANY**

Also in Germany, due to the continuous increase of aging population, it is expected that number of dementia patients will increase to 2.20 million in 2030. Therefore, social protection of these people is becoming an important social problem. German long-term care insurance is also providing various supports for social care of dementia patients. 2002 for institution residents and care level 0 was given to dementia related subjects in 2008 to partially provide long-term care insurance benefits and from 2013, care benefits identical to general recipients were provided to dementia subjects.<sup>6</sup> The fundamental purpose of dementia support is to provide care and support appropriate for dementia. Thus, it is to alleviate stress (anger, aggressiveness) in subjects and to provide service according to personal need. German long-term care insurance will expand the care rating into 5 ratings from 2017 and dementia patients will have identical entitlement to general recipients.

### ***Application of New Long Term Care Concept***

For the provision of care benefits appropriate for dementia, from 2017, breaking away from existing physical activity ability focused selection criteria, independence (Selbstständigkeit) limitation degree is emphasized in the selection criteria of long-term care subjects to expand the long-term care ratings into 5 ratings to provide necessary benefits such as general guidance, observation, care, and support to mild dementia patients.<sup>7</sup>

Especially in dementia patients and people with psychological diseases and emotional disabilities, the degree of these disabilities interfering with independent life is reflected. In the new rating evaluation methods, degree of independence is evaluated in 6 areas important for care giving such as physical, psychological, and cognitive difficulties, elements about cognition and communication ability, behavior patterns and psychological problems, daily left composition and social contact, and self-care.

**Benefits**

The major benefits provided to people with dementia rating in German long-term care insurance is as follows.<sup>8</sup>

**Additional Care Benefit**

In home care for dementia patients, care services are provided on top of the existing basic caregiving and domestic support. This is the provision of help and support at the residence of the dementia subject. Thus, this includes at home activity support for communication and social contact, daily activities support at home such daily life planning and assistance in proper execution, activity assistance appropriate to needs and assistance for creation of day and night rhythm. Therefore, dementia subjects can flexibly receive personally necessary care benefits on top of the benefits provided at the home center.

**Additional Care Personnel Support for Day and Night Care**

At day and night shelters most frequently used by dementia patients, support for additional care personnel for dementia patients is possible. Compared to general care recipients, dementia patients require significant general observation and care support, additional assistance personnel is necessary for their care and activities. Therefore, care personnel for dementia patients at day and night shelters are additionally placed and the costs are paid entirely through the care insurance. The ratio of additional care personnel is 1 per 24 dementia residents.

**Dementia Residential Community Support**

In case of dementia patients, when the symptoms have progressed, care is difficult just with home benefits and there is promotion of expansion of dementia residential communities which are customized residential forms in case they are not the subjects of facility admission. Dementia residential communities are not care shelters and the advantage is that residents can apply for long-term care benefits together. In Berlin, there are around 480 elderly residential communities in 2012 and about 50% of them are specialized for dementia patients as shown in table 2.<sup>9</sup> These residential communities are fundamentally increasing based on care benefit provision of home centers. This is appropriate for the hopes of many dementia subjects who would like to live together while being guaranteed their personal life in an environment and residents that they are accustomed to.<sup>10</sup> For the expansion of dementia residential communities, €2,500 per resident and maximum €10,000 per residential community is supported to guarantee the establishment of residential communities appropriate for age and without hindrance to life. Also to support community running expenses, €200 a month are additionally supported per resident.

Table 3: Long-term care benefits in 2015 (in: euro/monthly)

benefits		care level	without dementia	with dementia
home care	cash	0	-	123
		1	244	316
		2	458	545
		3	728	728
	non-cash/ day and night care	0	-	231
		1	468	689
		2	1,144	1,298
		3	1,612	1,612
		hardship case	1,995	1,995
	stand-in care (6weeks/year)			1,612
short-time (4weeks/year)			1,612	1,612
supplementary benefit	basic amount	0-3	-	104
	increased amount			208
additional service for patient in outpatient in living groups		1-3	205	205
full-time residential care		1	1,064	1,064
		2	1,330	1,330
		3	1,612	1,612
		hardship case	1,995	1,995

### ***Integrated Support for Dementia Care***

In case of dementia, with progression, care needs increase and become more complex which requires individual care plan and cooperation and link among support systems including professional support and unofficial areas such as family. Major support systems necessary for effective dementia support is as follows.

- 1) Treatment planning, medical treatment, and monitoring is conducted through dementia related clinics. Or, physician support is given at home, day protection, and care residence.
- 2) Dementia support teams composed of occupational therapists, psychological surface, and sports rehabilitation therapists provide treatment service at home, day protection facilities, and care residence.
- 3) Systematic care service composed of care giving professionals, assistance personnel, and occupational therapists are important resources for home care and support.
- 4) Care service at home centers provide basic care giving, nursing care, and aviation care at the home and care residence.
- 5) Monitoring in case management is also important for adjustment and patient focused care.
- 6) When the support is conducted through a one-stop system, comprehensive information, consultation, and special service provision is possible for patients and family and agreements and information exchange with support fields and experts are possible.

Therefore, integrated dementia care system that supports dementia patients by integrating various support systems takes care of diagnostic services, consultation, information, education for dementia patients as well as dementia care and treatment support. By cooperating closely with experts, volunteers, and family, wide range of care support can be achieved for care according to dementia patient needs. This integrated support method supports and maintains the quality of life for dementia patients and family and has the purpose of prevention of health problems and delay of degenerative processes.<sup>11</sup>

### **IV. DEMENTIA SUPPORT IMPROVING PLAN**

With the introduction of special dementia rating in long-term care insurance in July 2014, it became possible for elderly with mild dementia to receive long-term care benefits and due to increase in dementia care recipients and benefit expansion, the importance and role of long-term care system is being emphasized. Continue support for elderly with mild dementia delays the progression into severe dementia to delay admission into care facilities and it is expected to improve individual quality of life and decrease related socio-economical costs. The study aims to provide dementia support activation plan necessary for effective and continuous provision of long-term care benefits in the long term.

First is the expansion of benefit subject. In a situation where dementia patients are continuously increasing, it is important to provide dementia benefits at the early stages of dementia. Therefore, there is need to establish reasonable subject expansion plans so that dementia support can be given to early dementia patients. Expansion of support for early stage dementia patients has an effect of decreasing socio-economical costs in the long term. Also, there needs to be effort in stepwise support expansion so that dementia benefits differentiated from general recipients can be provided to people with severe dementia rating.

Second, cognitive training and home support service provision considering dementia patient characteristics are necessary. In case of German long-term care insurance, the purpose of dementia subject care focuses on independent and stable daily life maintenance and protection. For this, also for home benefits, various assistances are provided on top of basic care such as home support, social activity support, and daily life engagement. In Korea, general domestic services are based on the premise of assistance from family. However, in case of single household elderly, family who work, and elderly craft difficulties receiving family assistance, it is necessary to provide home support services.

Third, there needs to be activation and expansion of day and night care. Day and night care services help cognitive function improvement and daily life ability maintenance in elderly with dementia and has positive role in maintaining health. Also it has positive effects in relieving family conflict due to care giving and family economic activity. Therefore, for dementia patients, active use of day and night care facilities is necessary for function maintenance and improvement and family support. Already from 2013, for the activation of day and night care, financial burden is being alleviated for recipients utilizing more than eight hours a day and 20 hours a month by additionally applying 50% over the limit. However to activate day and to help dementia patients, there needs to be continuous expansion of day and night care facilities. Based on November 2014,

there are about 300,000 dementia rating 3~5 recipients but there are only 1670 day and night care facilities nationwide with capacity of 260,000 people.

Fourth, for continuous care and support for dementia patients, assistance from unofficial care personnel were close to the patient such as family is required. Therefore, for continuous dementia care by families, there needs to be establishment of basic social support and support plans for them. In Germany, family support was expanded so that official and unofficial support of long-term care service will be provided in complementation and families also have an important role in the home care of dementia patients within the long-term care insurance system. In this aspect, in medium term, by establishing support plans for families such as basic social insurance support and support plans related to care such as cash benefits to promote continuous care at the home.

Lastly, integrated dementia service provision system for dementia patients must be established in the long-term. Dementia patients especially require interrelated support of medical and nonmedical support according to dementia status and progression. Thus, things such as cognitive, psychological and social, dance treatment and occupational treatment services are oriented towards care methods that are preventative and are in accordance with principles of personalization. Therefore, systematic venture support taste on systematic integration contributes to improvements in quality of life in dementia patients, as well as medication of care giving burden of families. Especially as increase of elderly with dementia is predicted, to continue residence possible life, there needs to be continuous dementia care support at the home. As an alternative, it is to avoid admission into facilities by increasing satisfaction of recipients by diversifying dementia support through close network creation with various local community dementia self-help groups and Alzheimer's associations.

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## What is the Meaning of Social Network Services in India?

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### Abstract---

**Background/Objectives:** We thought we needed to identify how people use SNSs from the more practical perspective. Therefore, in this paper, we supposed that there were some distinctive groups.

**Methods/Statistical analysis:** To identify how the patterns of SNS users, we have conducted K-mean clustering analysis with collected data. Clustering analysis aimed to identify similar entities from the characteristics they possess.

**Findings:** We have interpreted that usage suggestion could affect voluntary/involuntary usage behavior of SNS. In addition, initially, we have supposed that there were significant differences among group especially in terms of personality. However, it was not possible to conduct additional analysis by using personality variables because of sample size with untruthful responses.

**Improvements/Applications:** In this paper, we have interpreted that usage patterns could divide into several types by the reason why they use SNS.

**Keywords---** Social Network Service, Usage Patterns, Cluster Analysis, SNS Functions, SNS.

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## **I. INTRODUCTION**

Most people want to communicate with their friends by using media that are more efficient because they can deliver something which want to talk more correctly than they use traditional ways such as using letter, documents, telephone, and so on. In fact, everyone who uses those kinds of existing media has had no choice to make miscommunications because those have temporal- as well as spatial restrictions. After the advent of internet, we do not need to make efforts to talk about something with your friends living not only within a near but also a long distance. In addition, you can share a number of information easily with anybody. To meet such needs that internet users had, SNSs such as Facebook, Twitter, Cyworld, Myspace, etc has become one of efficient sites with a tremendous popularity since the end of 1990s. Along with those things, as we know it, a shape of SNSs also has been changing in terms of functions. SNSs of the past were simply used for communication. However, SNSs of today include a variety of functions to meet their user's diverse needs. At the same time, different forms of SNSs have appeared like Dogster, Flickr, and LinkedIn for example. That is to say, those targeted for various user's preferences. More important, we need to pay attention to the fact that there are many types of users in SNSs. So, we supposed that there were distinctive user groups which could be divided by their usage patterns<sup>1</sup>.

## **II. LITERATURE REVIEW**

### **A. Social Network Service**

Social Network Service (SNS) is one of ways widely used for keeping touch with your friends. SNS is mostly defined as an online service to build social network and social relations by using online services. Those include both web-based and mobile-based services, which are generally called as Social Network Services. In this paper, however, we have considered SNSs as same as definition of Social Network Site because Social Network Services that dealt with in this paper were based on web service basically. According to Boyd and Ellison (2008), Social Network Sites have been defined as "Social network sites as web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system." SNSs help individuals to make up profile and maintain social relationship within a bounded system<sup>2</sup>. But, recent SNSs have been evolving fast. Those provide a variety of function more than a previous form of SNSs. For instance, Face book, the biggest SNS in the world in 2016, have provided individuals various functions, which include games, sharing links, video conferencing and etc, as well as basic functions such as writing comment, and uploading photos. Above this, there were a number of kinds of SNSs specialized in some particular functions such as Flickr (a photo sharing service) and YouTube (a video sharing service).

### **B. Social Interaction**

Because of the powerful functions of SNS, the number of people using SNS is increasing dramatically. It seems that SNS is just not a tool for entertaining oneself but achieving the Social Interaction among them. So we regarded the human's desire for Social Interactions as the most important factor for using SNS. According to Cho et al (2012)<sup>3</sup>, Social interaction is one of the most important concepts to society at large because its stimulus to a person would be dispersed and expanded by network channels. There is an another perspective for Social Interaction by Giddens(1984)<sup>4</sup>. He insisted that Social Interaction involves displaying of trust in the routinization and predictability of everyday life. Under the trust between people, we desire to display our daily life and SNS make it possible. John and Susan(1996)<sup>5</sup> classified channel of social interaction as three parts on his study(local channel, national channel, global channel). Then how can these channels are emerging? We insist that SNS can make these channels for Social Interaction. Moreover, the functions of SNS would be a tool for interaction. In this paper, we investigate about SNS functions in detail to establish our theoretical background

### **C. SNS Functions**

Generally, functions of SNS consist of core functions and additional functions because most SNSs include similar functions for communicating among users but, most sites have been developing additional functions for meet their user's needs. For example, they provide differentiated functions such as video conferencing, jukebox, games, blogging, and etc. Therefore, basically, definition of SNS functions differs to each researcher. According to Ritcher and Koch(2008)<sup>6</sup>, SNS functions were divided into six functions. Those included (1)

Identity management, managing the availability of identity information; (2) Expert search, in this context one has to distinguish between the possibility to search the network according to different criteria and the possibility to proactively receive recommendations of interesting contacts by the SNSs; (3) Context awareness, awareness of a common context with other people; (4) Contact management, it combines all functionalities that enable the maintenance of the personal network; (5) Network awareness, the awareness of the activities (and/or the current status and changes of the latter) of the contacts in the personal network is supported by functionalities; and (6) Exchange, it combines all possibilities to exchange information directly or indirectly.

In addition, of course, they may be differed in compliance with the perspectives of each researcher. According to Kim et al(2010)<sup>7</sup>, similarly, they divide main functions of SNS into eight functions. Those include (1) Personal profiles, most social websites create and manage personal profiles, that is, homepages, however, they differ in the types of information; (2) Establishing online connection, many social websites provide facilities for a member to discover connection ("friend") candidates from existing members; (3) Participating online groups, many social websites support a small number of default groups and assign new members to one or more of them; (4) Communicating with online connections, social websites provide various facilities for members to use to communicate with their online connections, that is, friends and other members; (5) Sharing UCCs, most social websites allow members to post various types of UCCs, such as blogs, microblogs, photos, images music, video, bookmarks, and text; (6) Expressing opinion, most social websites allow members to leave comments on the UCCs(User-Created-Contents); (7) Finding information, both members and nonmembers have two types of facilities to find the information they need on social websites. The search engines can be used to look for the names of people, names of groups, and particular UCCs; and (8) Holding the users, many social websites provide various features that are designed to have the users spend a long time on the sites, and have them return frequently.

As described above, definition of SNSs functions may differ to each SNS. However, in this paper, we focus on actual functions usage in two particular SNSs widely used in India (Facebook and Twitter) because those are the most popular SNSs of India.

### III. RESEARCH QUESTIONS

In this paper, we have set up the following research questions. First, do quantities of users' SNS functions usage take form distinctive user groups? Second, what are the demographic traits of them if there are distinctive groups? Lastly, what are the personality traits of users in each group?

As mentioned above, we have made three research questions in total. We have thought there were distinctive user groups in a compliance with quantities of users' SNS functions usage. According to P.B. Brandtzeg and J. Heim (2009)<sup>8</sup>, they discovered there were various reasons such as friends, socializing, information, debating, free SMS, time-killing, sharing/consuming contents, unspecified fun, profile surfing, family, and etc when online users used SNSs. Also, Richter and Koch (2008) explained that there were various SNS functions divided by SNS usage motivations. It could be interpreted that there were distinctive user groups because we have supposed SNSs usage patterns also could be presented differently among users if they had different usage motivations. In addition, if there are distinctive user groups, the demographic traits (gender, age, yearly income, weekly SNS usage time, and etc) of each of them might be presented differently. Finally, we have supposed that the personality traits of each group also could be presented dissimilarly.

### IV. RESEARCH DESIGN

#### A. Measurements

We have distributed 200 questionnaires (2016 April) to online users in India of both Facebook and Twitter. The number of valid responses for measuring was 166 out of them. We excluded 16 untruthful responses. You can see the composition of questionnaire with Table 1.

Table 1: Composition of the Questionnaire

Concepts	Items	The number
Total usage quantities of Facebook	How much do you use each function?	18 items
	Average usage time for each function	18 items
Total usage quantities of Twitter	How much do you use each function?	15 items
	Average usage time for each function	15 items
Total		88 items

The questionnaire is composed of 88 items in total. However, In the case of Facebook users, we got them answered just 58 items. If they usually use Twitter, we got them answered 52 items only. In addition, we asked respondents how much they use each function of Facebook (36 items) or Twitter (30 items) as well as how much time they use each function averagely. To measure respondents' personality, we gave them 10 items<sup>9</sup>. Moreover, we gave them 12 demographic items.

To measure how much they use each function of Facebook or Twitter, we classified every function except detail functions regarding settings because most users rarely use resetting options. Therefore, we sorted 18 functions of Facebook (Find friends, Visit Friend's Page, Message, Writing a Comment, People you may know, Like/Dislike, Groups, Pages, Photo, Video, Link, Question, Update Status, Profile Edit, Notes, Events, APPS) and 15 functions of Twitter (Timeline, @mentions, Tweet, Retweet, Browse Interest, View your favorites, Profile edit, Find Friends, Following, View Followers, Visit friend's page, Message, View suggestion, Invite Friends, Edit your Theme) in total.

As we mentioned in the section 2-3, it was not easy to decide how to measure SNS users' personality because we knew that the respondents should have spent too much time with about one-hundred items to complete questionnaires if we used traditional FFM measurements. Therefore, we have decided to measure users' personality by using TIPI. Those include 10 items to measure personality (extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience)<sup>10</sup>.

### **B. Methodology**

To identify how the patterns of SNS users, we have conducted K-mean clustering analysis with collected data. According to Joseph F. Hair, Jr. et al (1987), clustering analysis aimed to identify similar entities from the characteristics they possess. They described it identified and classified objects or variables so that each object was very similar to others in its cluster with respect to some predetermined selection criteria.

Before that, we put both self-assessments how much a respondent use each function and average usage time for each function into formula to correctly measure quantity of each function of SNS. We made an expression ( $\sqrt[2]{a \times b}$ ). As you can see, 'a' in the expression is self-assessments how much a respondent use each function, and the 'b' is average usage time for each function.

The reason that we calculate it as described above is to measure actual usage quantity of SNS functions. Along with them, we also have conducted factor analysis to identify reliability and validity of measurements. Lastly, we have conducted ANOVA analysis to identify differences among groups.

## **V. RESULTS**

### **A. Demographic Traits**

We have conducted frequency analysis to identify the demographic traits of the samples of this paper. In total 166 survey participants from 2016 April until May, the ratio of male participants was 91.6% (N=152) and female were 8.4% (N=14). The spread of participants' age presented that 13.3% of entire (N=22) was younger less than 18, and 83.1% of entire (N=138) were more than 18 and less than 27, And 53% of entire (N=88) was being in college. 12% (N=20) of entire visited SNS less than 2 times per week. More important, 42.2% (N=70) of them visited SNS over 15 times weekly. In addition, many of participants (41%, N=68) were suggested to use the SNS by their online friends. Above this, 62.7% (N=104) of entire participants had more than 130 friends in SNS. And they mostly used PC (27.7%, N=46) and Laptop (57.8%, N=96) to use SNSs. Also, 73.5% of them (N=122) only permitted friends they knew to visit their own SNS pages. Many participants were students. So 86.7% (N=144) of entire participants earned below 90 thousands Indian rupees yearly. 94% (N=156) of entire was unmarried. 67.5% (N=112) of entire was from Northern India and 18.1% (N=30) was from Western India. the traits of samples are presented variously.

### **B. Factor Analysis**

As shown **Table 2**, In this section, we have conducted factor analysis to identify validity of measurement with principal component analysis and Varimax rotation method. We also excluded wrongly loaded 6 functions (Chatting, Like/Dislike, Groups, Pages, Question, and Application) to divide factors from the exploratory perspectives to increase validity and reliability of measurement we used in compliance with the existing research.

Table 2: Factor Analysis of Facebook Functions

Name of Functions	Component			
	1	2	3	4
Video	<b>.836</b>	.282	.017	-.013
Photo	<b>.825</b>	.138	.287	.003
Link	<b>.657</b>	.089	.167	.372
Event	.179	<b>.828</b>	-.026	.134
Note	.081	<b>.757</b>	.091	.250
Profile Edit	.253	<b>.628</b>	.372	-.076
Visit Friends	.059	-.091	<b>.863</b>	.213
Write Comments	.230	.353	<b>.652</b>	.080
Update Status	.461	.232	<b>.596</b>	-.206
People you may know	.044	.127	.327	<b>.762</b>
Find Friends	-.064	.260	-.196	<b>.639</b>
Message	.448	-.048	.116	<b>.592</b>

Extraction Method: Principal Component Analysis/Rotation Method: Varimax with Kaiser Normalization.

As you can see above, the first factor is regarding contents sharing. Those include the 3 functions (Video, Photo, and Link). Factor loadings of them presented .836, .825, and .657. We named this factor as Contents Sharing. Second factor was regarding personal managements. It includes Event, Note, and Profile edit. Factor loadings are .827, .757, and .628. We named this factor as Personal Management. Third factor was about contact and expressing opinions. This factor also includes Visit Friends, Write Comments, and Update Status. We named this factor as Communication. Lastly, the fourth factor includes People you may know, Find friends, and Messages. The factor loading of each function was .762, .639, and .592. We also named the fourth factor as Contents Management.

As shown in **Table 3**, the communalities of every variable have presented value more than 0.4, which means they have been appropriate to use in the factor analysis. Communality means rate explained by extracted factors. Generally, communality value less than 0.4 has known as it was not enough to conduct factor analysis.

Table 3: Communalities of Facebook Functions

Name of Factors	Name of Functions	Extraction
Contents Sharing	Video	.519
	Photo	.705
	Link	.780
Personal Management	Event	.605
	Note	.603
	Profile Edit	.650
Communication	Visit Friends	.736
	Write Comments	.567
	Update Status	.783
Contact Management	People you may know	.610
	Find Friends	.802
	Message	.664

Extraction Method: Principal Component Analysis.

In addition, as shown **Table 4**, the total variance explained of the 4 factors in this paper has been presented as above. Total cumulative percentage of variance explained of them has presented 66.861%. It means that 4 factors suggested above have accounted for 66.861% of variance explained of them as a result of factor analysis. Thus, the twelve functions used in factor analysis have accounted for each four factor.

Table 4 : Total Variance Explained of Facebook Functions

Name of Functions	Total	% of Variance
Contents Sharing	2.391	19.923
Personal Management	2.032	16.937
Communication	1.942	16.180
Contact Management	1.658	13.821

-Extraction Method: Principal Component Analysis.

**C. Reliability Analysis**

We have conducted reliability analysis to identify whether each factor extracted by factor analysis was reliable or not. As shown in **Table 5**, we only have extracted factors that contained higher than 0.5 of the Cronbach's alpha.

Table 5: Reliability Analysis of Facebook functions

Name of Functions	Cronbach's alpha
Contents Sharing	.792
Personal Management	.705
Communication	.692
Contact Management	.542

As you can see above, every factor has presented more than 0.5. Generally, many researchers consider more than 0.6 of alpha value as a reliable factor. However, in this paper, we have considered that factor named Contact Management, which presented 0.542 of Cronbach's alpha, was also reliable because we intended to identify whether there were distinctive groups from the exploratory perspective

**D. Cluster Analysis**

After conducting factor analysis, we have conducted cluster analysis to identify whether there have existed distinctive users' group. For the first step, we have selected K-means cluster analysis to make users several groups. As a result, we have decided to divide them into 6 groups by using 4 factors.

Table 6: Clustering of Facebook Users

Factors	Clusters		
	1 (N=42)	2 (N=70)	3 (N=52)
Contents Sharing	2.30	<b>1.92</b>	<b>3.13</b>
Personal Management	1.89	1.57	2.26
Communication	<b>3.01</b>	1.85	2.87
Contact Management	2.00	<b>1.92</b>	2.84

As shown in **Table 6**, we have extracted 3 types of groups from the samples. The users in the first group mainly have been toward to use usually communication functions more than other groups. In addition, the users in the second group have been toward to use every function similarly. The third group has been toward to use contents sharing.

We have conducted Chi-Square analysis by using to identify independence as well as relation among variables.

**E. Differences Analysis**

In this section, we have conducted Chi-Square analysis to identify significance of demographic variables. Those include users' education, major SNS usage environments, privacy, marriage, usage suggestions and place they were from. In conclusion, we have not found differences in compliance with those variables except usage motivation. Pearson Chi-Square of every variable except usage suggestions were not significant ( $p < 0.05$ ). However, the usage suggestions have presented that there were significant difference between groups (Pearson Chi-Square 0.034,  $p < 0.05$ ). In the case of the first group, 42.9% of users in this group have used Facebook by suggestions of online friends. And 23.8% in this group were suggested by offline friends. And 28.6% in this group were suggested by media. In the case of the second group, 51.4% in this group were suggested by online friends. And 31.4% in this group were suggested by offline friends. In the third group,

38.5% of users in this group were suggested by media. In the case of users in the first group, they have been toward to use communication function harder than other group. And third group users use contents sharing functions as well as communication harder in comparison with other groups. Both the first group and third group were affected by media. They usually use communication function. But, each function usage quantities of users in the second group were not only lower than other groups but also nearly the same. We have interpreted that the second group involuntarily use SNS itself. But, they use it just because of their friends. Both the first group and the third group focus on using particular functions. But, in the case of the second group use all functions similarly. It means media (online, offline) affects usage patterns of users in SNS more than other demographic variables in this paper.

Second, we also have conducted ANOVA analysis by using weekly average visit frequency, average usage time per one visit, the number of friends, and yearly average income as dependent variables to identify differences between groups. We have set up significance level at 0.05. As a result, we could not find significant variables out of them. So, weekly average visit frequency, average usage time per one visit, the number of friends, and yearly average income have not been significant on usage patterns.<sup>11</sup>

## VI. CONCLUSION AND LIMITATION

With analyses to identify differences among groups, we have realized that there were differences of usage suggestions (by on/offline media, on/offline friends, and family/relatives) between them. This implicates that they could connect to usage patterns of SNS users.<sup>12</sup> We have interpreted that usage suggestion itself could affect voluntary/involuntary usage behavior of SNS. In addition, initially, we have supposed that there were significant differences among group especially in terms of personality. However, it was not possible to conduct additional analysis by using personality variables because of sample size. Also, we were supposed to conduct this research with data collected from both Facebook and Twitter. But, most users in India were familiar with using Facebook rather than Twitter.<sup>13</sup> That is why we have excluded Twitter users for analyses. To have a better result, a qualitative perspective methodology also needed near future. Although we could find some distinctive groups, we could not find their traits clearly but dimly. Because of the limitation of qualitative explanation, we could not focus on multi-dimensional characteristics of three groups. We argue that these three groups can position nearby if they were placed in a particular framework that is consisted of multi-dimensional characteristics.<sup>14</sup> To do so, two axes mutually independent would be needed to investigate the interaction among derived groups. As a result, conclusion and limitation that we described above could considered as some of critical issue in the future research

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## Dynamic Analysis of Changes in Efficiency and Productivity within Chinese Commercial Banks with Foreign Capital Inflow

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### Abstract---

**Background/Objectives:** This study aims to answer the following two major questions; (1) Has the productivity of those changed after the foreign capital inflow? (2) If the productivity change exists, what are the determinant factors for it?

**Methods/Statistical analysis:** This study through an empirical analysis with 433 Chinese commercial banks using the up-to-date Bank Scope data during the eight years from 2003 to 2010. In particular, this study presents a dynamic analysis framework considering the time lapse using two distinctive methodologies such as Data Envelopment Analysis (DEA) efficiency and Malmquist Index (MI) productivity. Next, the determinant factors are identified by statistical models.

**Findings:** Results of the analysis show as follows; (1) The foreign capital inflow improved the DEA efficiency and MI productivity of the Chinese commercial banks analyzed, (2) However, it required a certain amount of time lapse approximately three years or longer to exert its effect on the productivity change, (3) Additionally, from the regression analyses, two important determinant factors were identified such as the enhancement of the cost structure and the liquidity management.

**Improvements/Applications:** Meanwhile, due to the limitation of the samples, the impact of the U.S. financial crisis of 2008 is not adequately controlled in this study.

**Keywords---** Chinese Commercial Bank, Data Envelopment Analysis, Efficiency, Foreign Capital Inflow, Malmquist Index, Productivity.

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## I. INTRODUCTION

Since accession to the World Trade Organization (WTO) in the year of 2001, China has been promoting the opening of its financial markets. Consequently, the overseas listing of Chinese commercial banks and full-fledged foreign capital inflow have been achieved. An et al.<sup>1</sup> discussed the contribution of Foreign Direct Investment (FDI) on China's money supply as well as the economic development in China. However, Li<sup>2</sup> reported that the effect of monetary policy on financial market was limited in the time of the recent economic crisis. Sethuraman et al.<sup>3</sup> argue that the banking channel paradigm has been expanded dramatically from branch to off-site formats across geographies.

According to a 2011 report by the China Banking Regulatory Commission (CBRC), a total of nine Chinese commercial banks were listed on the Hong Kong Stock Exchange (HKSE), including five large commercial banks (LCBs), three joint-stock commercial banks (JSCBs) and one rural commercial bank (RCB). In addition, at the end of 2011, the number of locally incorporated foreign bank (LIFB) corporations, including their branches and subsidiary agencies, was 387, with the total amount of their assets reaching up to 2,153.5 billion Yuans. This is equivalent to 1.93% of the assets of the entire banking industry of China (CBRC<sup>4</sup>).

During a short-term period, an intense influx of foreign capital into the banking industry in a specific country has occurred in certain cases. First, certain countries experienced bank's restructuring to overcome a currency or financial crisis and then foreign capital inflow occurred. For example, during the 1997 Asian financial crisis, in Asian countries such as South Korea, Indonesia, Malaysia, Thailand, and the Philippines, some banks had foreign capital inflow. Additionally, a number of U.S. banks experienced foreign capital inflow after the U.S. financial crisis of 2008 (Arena<sup>5</sup>). Second, when the financial markets of a certain country are open to foreign investors for the first time or the width of the opening is enlarged due to deregulation, foreign capital inflow into banks can be anticipated. Since the 2000s, Chinese commercial banks have had continual foreign capital inflow, which can be attributed to a more opportunities due to deregulation. In fact, the Chinese government aimed to promote the reform of the banks and the strengthening the banks' international competitiveness through foreign capital inflow.

The present study focuses on the effects of foreign capital inflow on the productivity of commercial banks during a period when financial markets opened. In particular, China's financial markets opened fully with the country's accession to the WTO in 2001. This created a good example to verify the effects. In general, a government deciding to open its financial markets can expect the following: (1) the introduction of advanced financial management techniques, (2) an improved quality of service and productivity, and (3) strengthening international competitiveness. In this context, research is needed to give a clear-cut answer to the question: "Has foreign capital inflow improved the productivity of Chinese commercial banks?"

Still, only a limited number of studies have been conducted relating to the productivity change of commercial banks induced by foreign capital inflow. As described in more detail in section 2, most previous studies analyzed the productivity change of Chinese commercial banks since the 2000s, and some of them just verified the differences in productivity between the types of banks. Meanwhile, Berger et al.<sup>6</sup> and Jiang et al.<sup>7</sup> discussed the productivity change over time of Chinese commercial banks associated with foreign capital inflow. Berger et al. examined the influence of the minority foreign shareholders with 38 Chinese commercial banks from 1994 to 2003 and noted that the overall efficiency of the banks analyzed was significantly improved due to foreign capital inflow. Jiang et al. compared productivity among four types of Chinese commercial banks, including state-owned commercial bank (SOCB), JSCB, city commercial bank (CCB), and LIFB from 1995 to 2005. They showed that: (1) JSCBs were better than the others in terms of profitability, and (2) equity acquisition by foreign investors was preferable to initial public offerings (IPO) in terms of improving long-term productivity.

The present study mainly investigates the productivity change of Chinese commercial banks due to foreign capital inflow in the 2000s. Chinese financial markets have been opened to foreign investors for more than 10 years. Chinese commercial banks, therefore, provide timely examples for verifying the effects of foreign capital inflow on productivity and to find the determinant factors for such productivity changes. Specifically, the present study aims to answer the following two questions: (1) has the productivity of banks changed after foreign capital inflow? and (2) if productivity change exists, what are its determinant factors? From a methodological point of view, the present study presents a dynamic analysis framework in which the time lapse can be considered explicitly. Two methodologies are used such as data envelopment analysis

(DEA) and Malmquist index (MI). Using these two methodologies, the present study clearly distinguishes between DEA efficiency and MI productivity. This is a distinction of this study compared to previous studies dealing with the efficiency or productivity of Chinese commercial banks. First, the efficiency change is examined by DEA and then the productivity change is analyzed with MI. Subsequently, the determinant factors are identified using regression analyses.

As aforementioned, DEA and MI are used in parallel so that the present study follows the idiomatic term usage as used in the related literature. Hereafter, unless stated otherwise, the term "efficiency" refers to DEA efficiency whereas the term "productivity" is associated with MI (Zhu<sup>8</sup>; Cooper et al.<sup>9</sup>; Cooper et al.<sup>10</sup>). The present study is organized as follows: Section 2 includes a literature review. Section 3 reviews the research models. Section 4 describes the samples to be analyzed; and section 5 is the empirical analysis. Finally, conclusions and limitations are summarized in section 6.

## **II. LITERATURE REVIEW**

### ***A. Analysis of the Efficiency and Productivity Change of Chinese Commercial Banks***

Several research papers have reported on the efficiency and productivity change of Chinese commercial banks since the country joined the WTO in 2001. Zhu and Cho<sup>11</sup> compared SOCBs and JSCBs from 1999 to 2003. They found no statistically significant difference of the pure technical efficiency before and after the WTO accession, whereas the scale efficiency and the technical efficiency had deteriorated since the WTO accession. Matthews and Zhang<sup>12</sup> analyzed the productivity change using five SOCBs, nine JSCBs, and 47 CCBs from 1997 to 2007. They reported that only CCBs' productivity had increased from 2003 to 2007.

Meanwhile, some studies showed the improved efficiency of Chinese commercial banks since the WTO accession, which to some extent opposes the findings of the studies above. Lee and Park<sup>13</sup> found the efficiency improvement of five SOCBs and 10 JSCBs from 2003 to 2007. They also showed that the improvement's magnitude was the largest in 2007. Liu<sup>14</sup> compared four LCBs of South Korea (i.e., Citibank Korea, Hana Bank, Kookmin Bank, Korea Exchange Bank) and four LCBs of China (i.e., Bank of China, Bank of Communications, China Construction Bank, Industrial bank of China) from 2005 to 2009 and reported that the efficiency was highest in 2007 and lowest in 2009. These findings were attributed to the U.S. financial crisis of 2008 for both countries. Barros et al.<sup>15</sup> measured the efficiency of five SOCBs and 12 JSCBs from 1998 to 2008. In their study, the banks' efficiency had greatly improved since the WTO accession. Also, they argued that the configuration and the ratio of share regarding ownership was unrelated to the improved efficiency. Luo and Yao<sup>16</sup> verified that the efficiency of a sample of 14 Chinese commercial banks had increased approximately 5% during the period 1998 to 2008. In particular, SOCBs' efficiency was relatively more enhanced.

Chang et al.<sup>17</sup> examined the major causes of the increase in the productivity of 19 Chinese commercial banks, consisting of four SOCBs, 10 JSCBs, and five CCBs from 2002 to 2009. They remarked that the increase in the total factor productivity was mainly attributed to the technical progress, which compensated degenerated efficiency. Li<sup>18</sup> concluded that the technical efficiency was much more enhanced than the scale efficiency with 14 Chinese commercial banks (i.e., five LCBs and nine JSCBs) from 2001 to 2010. Zhou<sup>19</sup> pointed out that some banks' scale efficiency declined during the period from 2004 to 2009 even though the 10 Chinese commercial banks gradually accomplished overall improved efficiency.

### ***B. Comparisons of the Efficiency by Type of Chinese Commercial Bank***

Chinese commercial banks can be classified as LCB, JSCB, CCB, RCB, LIFB, and so forth. Additionally, these banks can be classified as foreign capital inflow bank (FCIB) versus a non-FCIB depending on the presence of foreign capital inflow (FCI). In particular, most of the related papers analyzed differences in efficiency between SOCBs versus private commercial banks (PCBs). Lee and Park analyzed the scale efficiency of Chinese commercial banks from 2003 to 2007. They showed that JSCBs' scale efficiency had improved more than SOCBs' since the WTO accession. Berger et al. verified the influence of minority foreign shareholders on the efficiency of 38 Chinese commercial banks from 1994 to 2003. In their study, Berger et al. showed that LIFBs' efficiency was the highest, whereas SOCBs' was the lowest. Similarly, Lin and Zhang<sup>20</sup> reported that the group of four SOCBs had the lowest profitability and a weakness in asset quality compared to the other types of banks based on the analysis of 30 Chinese commercial banks from 1997 to 2004. Oh<sup>21</sup> showed that PCBs' scale efficiency was better than SOCBs' in comparing four SOCBs versus eight PCBs in 2004. Wei and Wang<sup>22</sup>

reported that JSCBs' efficiency was higher than SOCBs' through the analysis of 12 Chinese commercial banks in 1997.

On the contrary, some research papers argued that SOCBs' efficiency was better than PCBs'. Hu et al.<sup>23</sup> analyzed four SOCBs, two policy-related banks, and five JSCBs from 1995 to 2004. They found that SOCBs' efficiency was better than JSCBs' after controlling the exogenous factors and emphasized the importance of ownership designed to improve SOCBs' efficiency. Sufian<sup>24</sup> claimed that only SOCBs' pure technical efficiency was superior to JSCBs' based on comparing four SOCBs versus 12 JSCBs from 1997 to 2006.

### III. RESEARCH MODELS

#### A. Efficiency Analysis –DEA

DEA is a methodology of operations research (OR) that calculates the relative efficiency scores of a set of peer entities in the range of [0, 1]. Each entity, which is pursuing the same objective called a decision making unit (DMU), has common and multiple input-output variables. Assume that a set of n DMUs ( $j = 1, \dots, n$ ) having m input variables ( $i = 1, \dots, m$ ) and s output variables ( $r = 1, \dots, s$ ). Then, for each DMUj, "semi positive" vectors of input-output variables are defined as  $x_j \in R^{m \times 1}, y_j \in R^{s \times 1}$ . And, for all DMUs, the matrices of input-output variables are defined as  $X = (x_j) \in R^{m \times n}, Y = (y_j) \in R^{s \times n}$ . Eq.(1) is an input-oriented DEA model that calculates a DEA efficiency score  $z_0(\theta)$  of DMUo (Zhu; Cooper et al.; Cooper et al.). In Eq.(1), every element of  $0 \in R^{n \times 1}$  has a value of zero; all elements of  $e \in R^{n \times 1}$  are ones; and a semipositive  $\lambda \in R^{n \times 1}$  is a vector of DMU intensity.

$$\begin{aligned} \min_{\theta, \lambda} \quad & z_0(\theta) = \theta \\ \text{subject to} \quad & X\lambda \leq \theta x_0 \\ & Y\lambda \geq y_0 \\ & L \leq e^T \lambda \leq U \\ & \lambda \geq 0 \end{aligned} \tag{1}$$

The production possibility set P enveloped by the frontier is defined as Eq.(2). Here,  $\{(L, U)\} = \{(0, \infty), (1, 1)\}$  corresponds to two different returns to scale (RTS) assumptions such as CRS (constant returns to scale) and VRS (variable returns to scale), respectively, and in this order.

$$P = (X, Y) = \{(x, y) | X\lambda \leq x, Y\lambda \geq y, L \leq e^T \lambda \leq U, \lambda \geq 0\} \tag{2}$$

Each Chinese commercial bank in the sample explained in §4 is defined as a DMU in the present study. DMUs' input and output variables are determined based on the literature review below. First, it is necessary to examine perspectives on bank efficiency. Paradiet al.<sup>25</sup> classified the perspectives by approaching bank efficiency in three distinct categories: (1) production approach, (2) profitability approach, and (3) intermediation approach. The production approach is a perspective in which a bank is considered as an agent converting assets and labor to deposits and loans. The profitability approach focuses on the process of how assets and labor generates revenue and profits. Meanwhile, the intermediation approach is mainly interested in how efficiently deposits can be converted into loans.

Compared with developed countries, the Chinese government has been concentrating more on its economic growth. For this reason, its banking industry is comprised mostly of commercial banks that conform to national policy. As such, Chinese commercial banks mainly loan their deposits to customers and build their yield structures based on the difference between the interest rates of deposit and lending. In this context, it is appropriate to select DEA input and output variables according to the intermediation approach perspective to consider the characteristics of the Chinese commercial banks of concern.

More specifically, the intermediation approach perspective emphasizes that unused resources (e.g., deposits, liabilities, assets) should be minimized by switching the available resources to loans and investments for customers as much as possible (Colwell and Davies<sup>26</sup>; Paradi et al.). Hence, from the intermediation approach perspective, typical DEA input variables can be cash balances, commercial deposits, customer deposits, fixed assets and accruals, loan loss experience, net non-performing loans, other liabilities, and so on. Meanwhile, for DEA output variables, we can consider the following characteristics such as commercial loans, customer lending, homeowner mortgages, wealth management, and so on. Recently, several studies selectively adopted such characteristics for the variables analyzed to verify the efficiency of the banks concerned on the basis of the intermediation approach perspective (Hu et al.; Luo and Yao; Matthews and Zhang; Barros et al.). Referring to the literature, DEA input and output variables in the present

study are shown in Table 1. For DEA input variables, three characteristics are considered: total assets (xa), overheads (xb), and total customer deposits (xc). On the other hand, DEA output variables are operating income (ya) and loans (yb). Consequently, a total of five variables comprise the DEA model in the present study to analyze each DMU's efficiency.

Table 1: DEA Input-output Variables

DEA input variable
total assets (xa)
overheads (xb)
total customer deposits (xc)
DEA output variable
operating income (ya)
loans (yb)

**B. Analysis of the Productivity Change – MI**

The Malmquist index (MI) evaluates the productivity change of a DMU between two points in time. MI is defined as Eq.(3), which is the product of "Catch-up" and "Frontier-shift". Catch-up relates to the degree to which a DMU improves or worsens its efficiency, while a Frontier-shift reflects the change in the efficient frontiers between the two points in time. Hence, Catch-up can measure the rate of efficiency change, while Frontier-shift refers to the rate of technical change (Zhu; Cooper et al.; Cooper et al.).

$$MI = (Catch - up) \times (Frontier - shift) \tag{3}$$

Decomposing and interpreting MI is as follows. The productivity of DMUo is calculated by two different frontiers encompassing the production possibility set  $P^t = (X, Y)^t$ , which is composed of  $(x_j, y_j)^t = (x_j^t, y_j^t)$  at the two points in time  $t = 1, 2$ , respectively. First, Catch-up can be computed as Eq.(4). In Eq.(4), the notation of Eq.(5) is used, which is a numerical measure for the efficiency score of DMUo( $x_0, y_0$ )<sup>t1</sup> measured by the frontier at the time t2. Catch-up > 1 indicates progress in relative efficiency from t=1 to t= 2, while Catch-up = 1 and Catch-up <1, respectively, indicate no change and regress in efficiency.

$$Catch - up = \frac{\delta^2((x_0, y_0)^2)}{\delta^1((x_0, y_0)^1)} \tag{4}$$

$$\delta^{t_2}((x_0, y_0)^{t_1}) (t_1 = 1, 2 \text{ and } t_2 = 1, 2) \tag{5}$$

Frontier-shift > 1 indicates progress in the frontier around DMUo from the t=1 to t= 2, while Frontier-shift = 1 and Frontier-shift <1, respectively, indicate the status quo and regress in the frontier.

$$Frontier - shift = \left[ \frac{\delta^1((x_0, y_0)^1)}{\delta^2((x_0, y_0)^1)} \times \frac{\delta^1((x_0, y_0)^2)}{\delta^2((x_0, y_0)^2)} \right]^{1/2} \tag{6}$$

As the product of the two terms, Eq.(7) for computing MI can be obtained. MI > 1 indicates progress in the total factor productivity of DMUo from the t=1 to t= 2, while MI = 1 and MI <1, respectively, indicate the status quo and deterioration in the total factor productivity.

$$MI = \left[ \frac{\delta^1((x_0, y_0)^2)}{\delta^1((x_0, y_0)^1)} \times \frac{\delta^2((x_0, y_0)^2)}{\delta^2((x_0, y_0)^1)} \right]^{1/2} \tag{7}$$

As seen in Eq.(7), MI consists of four terms:  $\delta^1((x_0, y_0)^1)$ ,  $\delta^2((x_0, y_0)^2)$ ,  $\delta^1((x_0, y_0)^2)$  and  $\delta^2((x_0, y_0)^1)$ . The first two relate to the measurement within the same point in time,  $t_1 = t_2$ , while the last two are for intertemporal comparison with  $t_1 \neq t_2$ . Eventually, the former two within scores can be calculated using the linear programming (LP) model, Eq.(8) and the latter two intertemporal scores can be measured by the LP model, Eq.(9).

$$\begin{aligned} \delta^{t_1}((x_0, y_0)^{t_1}) &= \min_{\theta, \lambda} z_0(\theta) = \theta \\ \text{subject to } X^{t_1} \lambda &\leq \theta x_0^{t_1} \\ Y^{t_1} \lambda &\geq y_0^{t_1} \\ L &\leq e^T \lambda \leq U \\ \lambda &\geq 0 \end{aligned} \tag{8}$$

$$\begin{aligned} \delta^{t_1}((x_0, y_0)^{t_2}) &= \min_{\theta, \lambda} z_0(\theta) = \theta \\ \text{subject to } X^{t_1} \lambda &\leq \theta x_0^{t_2} \\ Y^{t_1} \lambda &\geq y_0^{t_2} \\ L &\leq e^T \lambda \leq U \end{aligned} \tag{9}$$

$$\lambda \geq 0$$

**C. Analyzing the Determinant Factors for the Productivity Change –Regression Analysis**

After measuring the productivity change in terms of MI for a DMU between two points in time, two regression analysis models of Eq.(10) and Eq.(11) are estimated to identify determinant factors for the productivity change. Eq.(10) includes a dummy variable of FCId (x11) to indicate the presence of FCI in a bank of concern, which divides the samples into two types such as FCIB versus non-FCIB. Therefore, Eq.(10) can verify the difference in the productivity change between the two types of banks. The dependent variables, y1, y2 are the productivity changes over time measured by MIs from the time t1 = 2004 to t2 = 2010. For the independent variables, some typical financial ratios regarding bank management are chosen as follows: growth ratio (Grra, x2), management adequacy (Maad, x3), earnings (Earn, x4), liquidity (Liqu, x5), asset quality (Asqu, x6) and capital adequacy (Caad, x7). Similarly, Eq.(11) examines determinant factors for the productivity change using only the FCIBs of the samples. Therefore, FCId (x11) in Eq.(10) is replaced with FCIp (x12), the variable representing the time lapse after FCI in Eq.(11).

$$MI_{(t_1=2004 \rightarrow t_2=2010)}(y_1) = \beta_0 + \beta_{11}FCI_d(x_{11}) + \beta_2Grra(x_2) + \beta_3Maad(x_3) + \beta_4Earn(x_4) + \beta_5Liqu(x_5) + \beta_6Asqu(x_6) + \beta_7Caad(x_7) + \varepsilon \quad (10)$$

$$MI_{(t_1=2004 \rightarrow t_2=2010)}(y_2) = \beta_0 + \beta_{12}FCI_p(x_{12}) + \beta_2Grra(x_2) + \beta_3Maad(x_3) + \beta_4Earn(x_4) + \beta_5Liqu(x_5) + \beta_6Asqu(x_6) + \beta_7Caad(x_7) + \varepsilon \quad (11)$$

Table 2 displays the description of regression variables, including the definitions, the proxy variables, the expected signs and the research hypotheses. According to the definition above, FCIBs have FCId (x11) =1, while non-FCIBs have FCId (x11) =0. As shown in Jiang et al., both FCId (x11) and FCIp (x12) are expected to have a positive influence on productivity improvement such that the expected signs are all positive(+) (H11(+), H12(+)). Grra(x2) is measured by the proxy variable, "growth rate of asset" and the expected sign is positive (+) based on the assumption that the asset has a positive influence on the productivity(H2(+)). Associated with the proxy variable, "cost to income ratio", the expected sign of Maad (x3) is determined as negative (-) assuming that higher productivity can be achieved with a lower cost to income ratio (H3(-)). Earn (x4) and Liqu (x5) are measured by "return on average equity (ROAE)" and "loan ratio" respectively, in order. Each of those is expected to have a positive(+) relationship with the dependent variables (H4(+), H5(+)) (Hong and Kim<sup>27</sup>). Asqu (x6) has the negative(-) expected sign because the proxy variable of "non-performing loan ratio" can be inversely proportional to the productivity improvement (H6(-)). As one of the principal capital ratios, "total capital ratio" is used to represent Caad (x7), and its expected sign is set to positive(+) based on its positive impact on improving productivity (H7(+)) (Kim<sup>28</sup>).

Table 2: Description of Regression Variables

Definition	Proxy variable	Name	Variable manipulation	Expected sign	Hypothesis
productivity change over time		y1,y2	MI <sub>(t1=2004-t2=2010)</sub>		
foreign capital inflow dummy		x11	FCIB=1, non-FCIB=0	(+)	H11
foreign capital inflow period		x12	2010-(foreign capital inflow year)+1	(+)	H12
growth ratio	growth rate of asset	x2	(asset of 2010)/(asset of 2004)	(+)	H2
management adequacy	cost to income ratio	x3	{(operating expenses)/(operating income) of 2010}/{(operating expenses)/(operating income) of 2004}	(-)	H3
earnings	return on average equity	x4	{(net income)/(average shareholders' equity) of 2010}/{(net income)/(average shareholders' equity) of 2004}	(+)	H4
liquidity	loan ratio	x5	{(net loans)/(total assets) of 2010}/{(net loans)/(total assets) of 2004}	(+)	H5
asset quality	non-performing loan ratio	x6	{(loan loss provision)/(net interest revenue) of 2010}/{(loan loss provision)/(net interest revenue) of 2004}	(-)	H6
capital adequacy	total capital ratio	x7	{(equity)/(total capital) of 2010}/{(equity)/(total capital) of 2004}	(+)	H7

#### IV. DESCRIPTION OF THE SAMPLES

At the end of 2011, the banking sector of China consisted of approximately 3,800 corporate bodies, including two policy and national development banks (PNDBs), five LCBs, 12 JSCBs, 144 CCBs, 212 RCBs, etc. First, it is important to note that the samples to be analyzed in the present study are confined to LCBs, JSCBs, CCBs, and LIFBs operating in Class 1 or Class 2 cities only. Due to the gap of economic development between different regions in China, it is necessary to remove this kind of exogenous factor as much as possible to homogenize the samples. According to a report published by the Beijing Academy of Social Sciences (BASS<sup>29</sup>), the Chinese government designated 35 major cities as so-called "headquarters" based on their level of economic development. Among them, there are four Class 1 cities of the highest level, including Beijing, Shanghai, Guangzhou, and Shenzhen. The eight second-highest Class 2 cities are Hangzhou, Nanjing, Tianjin, Chengdu, Wuhan, Qingdao, Ningbo, and Xiamen. Second, LCBs deploy their branches throughout the country and carry out nationwide business, while JSCBs and CCBs tend to establish their branches more in a certain region. Also, the size of the branches is not even regarding JSCBs and CCBs compared with LCBs. Therefore, with the samples, this study considers only the commercial banks operating at least one branch in the Class 1 or Class 2 cities. In this way, the present study controls for the regional characteristic.

Third, the data sources of the samples are as follows. Data relating to the financial statements of Chinese commercial banks are obtained from BankScope (BankScope<sup>30</sup>). The information for the FCI of the samples is based mainly on the foreign equity data in BankScope. In the meantime, because the FCI-related information is not a mandatory subject for public announcement, it is difficult to collect the necessary data. Moreover, even a certain number of Chinese commercial banks are not listed on the stock market; therefore, some data are not available. Hence, as for the banks listed, data gleaned from public announcements are scrutinized to supplement the data needed. In addition, the database of East Money Information Co., Ltd.<sup>31</sup> and the banks' websites are searched in preparing the data.

Consequently, the analysis samples are arranged in Table 3. The entire samples, which ranged from 2003 to 2010, are classified into three types: Type A (FCIB), Type B (non-FCIB) and Type C (LIFB). Type A has two subordinate types, A1 (FCI completed) and A2 (FCI ongoing). Type B is also divided into two subordinate types, B1 (to-be FCIB; i.e., a future FCIB) and B2 (not-to-be FCIB; i.e., a future non-FCIB). However, it should be noted that Type A consists of  $n_A = 149$  samples that have slightly different FCI periods. In the present study, a FCIB is defined as a bank that has acquired at least 3% ownership of foreign investors. In Table 3, the numbers of FCIBs and LIFBs increased from five and three in 2003 and to 28 and 24 in 2010, respectively, which exemplifies the persistent opening up of the Chinese banking industry since the 2000s.

Table 3: Summary of the Samples (i.e., Chinese Commercial Banks Analyzed)

		Type A		Type B		Type C
		FCIB		non-FCIB		LIFB
		FCI completed	FCI ongoing	to-be FCIB	not-to-be FCIB	
Year	Number of samples	Type A1	Type A2	Type B1	Type B2	
2003	30	3	2	16	6	3
2004	35	5	3	15	9	3
2005	41	8	5	11	12	5
2006	50	12	6	6	19	7
2007	64	18	4	3	20	19
2008	73	26	2	1	20	24
2009	70	27	0	1	18	24
2010	70	27	1	0	18	24
Total	433	126	23	53	122	109

#### V. EMPIRICAL ANALYSIS

##### A. Comparisons of the Efficiency of FCIB versus Non-FCIB

To determine the efficiency trend over time after the WTO accession, DEA is conducted with 433 banks in Table 3 during the period 2003 to 2010. Among the samples, one sample (i.e., Bank of Beijing) that experienced FCI in 2005 is excluded in §5.1 due to missing values from 2005 to 2007. In this DEA, the VRS model is adopted assuming that the economies and diseconomies of scale can be associated with the samples. The DEA model with VRS assumption calculates the pure technical efficiency that is separate from the scale

efficiency. DEA results are summarized in Table 4. Figure 1 presents the type comparisons with the means of DEA efficiency scores. In terms of the means, FCIBs' efficiency is the highest (i.e., Type A = 0.847), while LIFBs' is the lowest (i.e., Type C = 0.778) during the time horizon of 2003 to 2010. As shown in Figure 1, as a whole, an upward trend is observed until 2008 and then the trend takes a downturn after 2009.

As mentioned in §5.2.2, it is speculated that the Chinese banking industry was affected by the U.S. financial crisis of 2008. In general, although the results in §5.1 may not provide direct evidences for arguing that the presence and the time lapse after FCI improved the efficiency, FCIBs maintained the higher efficiency compared to the other two types during the time horizon examined.

Table 4: Summary of the Means of DEA Efficiency Scores for Type Comparisons

Year	Type A	Type B	Type C	Total
	FCIB	non-FCIB	LIFB	
2003	0.771	0.782	0.641	0.766
2004	0.819	0.793	0.654	0.787
2005	0.867	0.785	0.782	0.811
2006	0.835	0.819	0.892	0.835
2007	0.878	0.787	0.829	0.831
2008	0.901	0.829	0.884	0.875
2009	0.855	0.781	0.788	0.812
2010	0.838	0.753	0.739	0.782
Total	0.847	0.792	0.778	0.812

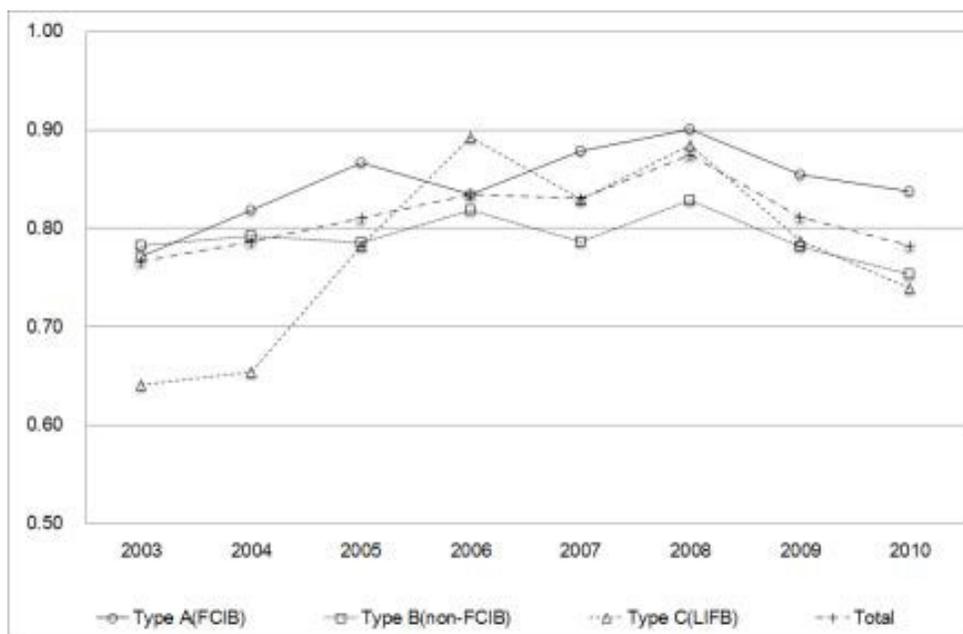


Figure 1: Type Comparisons with the Means of DEA Efficiency Scores

### B. Comparing the Efficiency and Productivity Before and After FCI

#### Efficiency

Among the samples shown in Table 3, only 21 samples (i.e., FCIBs) have the complete 5-year period data available before and after FCI as summarized in Table 5. Based on the principle of DEA/Window Analysis (WA), Table 5 presents a dynamic DMUs' allocation for analyzing the efficiency change over time (Charnes et al.<sup>32</sup>). Using this framework, five different DEA efficiency scores can be extracted for each sample during the 5-year period. For each FCIB in Table 5, the year is set to zero when its FCI occurs (i.e.,  $t = 0$ ), with the year before FCI corresponding to  $t = -1$ . The consecutive three years after FCI correspond to  $t = +1, +2,$  and  $+3$ , respectively. In Table 5, a new FCIB (i.e., Ping An Bank) is added to 2002 compared with Table 3, and two FCIBs in 2008 are analyzed up to  $t = +2$  due to their data availability.

Table 5: Dynamic DMUs' Allocation for Analyzing DEA Efficiency Change Over Time

Year	Bank name	Dynamic DMUs' allocation									
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
2002	Ping An Bank	t=-1	t=0	t=+1	t=+2	t=+3					
2003	Industrial Bank		t=-1	t=0	t=+1	t=+2	t=+3				
	Bank of Dalian		t=-1	t=0	t=+1	t=+2	t=+3				
2004	Bank of Communications			t=-1	t=0	t=+1	t=+2	t=+3			
	Shenzhen Development Bank			t=-1	t=0	t=+1	t=+2	t=+3			
	Qilu Bank			t=-1	t=0	t=+1	t=+2	t=+3			
2005	China Construction Bank				t=-1	t=0	t=+1	t=+2	t=+3		
	Bank of China				t=-1	t=0	t=+1	t=+2	t=+3		
	Hua Xia Bank				t=-1	t=0	t=+1	t=+2	t=+3		
	China Minsheng Banking Corporation				t=-1	t=0	t=+1	t=+2	t=+3		
	Bank of Hangzhou				t=-1	t=0	t=+1	t=+2	t=+3		
2006	ICBC					t=-1	t=0	t=+1	t=+2	t=+3	
	Guangdong Development Bank					t=-1	t=0	t=+1	t=+2	t=+3	
	Shanghai Rural Commercial Bank					t=-1	t=0	t=+1	t=+2	t=+3	
	Bank of Ningbo					t=-1	t=0	t=+1	t=+2	t=+3	
2007	China Merchants Bank						t=-1	t=0	t=+1	t=+2	t=+3
	China CITIC Bank						t=-1	t=0	t=+1	t=+2	t=+3
	Bank of Chengdu						t=-1	t=0	t=+1	t=+2	t=+3
	Bank of Chongqing						t=-1	t=0	t=+1	t=+2	t=+3
2008	Evergrowing Bank							t=-1	t=0	t=+1	t=+2
	Bank of Qingdao							t=-1	t=0	t=+1	t=+2

Table 6 contains DEA efficiency scores for 21 FCIBs during the 5-year period before and after FCI. In Figure 2, a sharp rise of the mean of DEA efficiency scores occurs at t = +3 even if the range of 0.031 (= 0.965 – 0.934) is absolutely very small. This implies that a certain amount of time lapse (e.g., three years or longer in this case) might be required after FCI before the efficiency improvement FCI induces is realized.

Table6: Summary of DEA Efficiency Scores for Analyzing DEA Efficiency Change over Time

Year	Bank name	t=-1	t=0	t=+1	t=+2	t=+3
2002	Ping An Bank	0.926	0.841	0.917	0.876	0.950
2003	Industrial Bank	1.000	1.000	1.000	0.984	1.000
	Bank of Dalian	0.890	0.847	0.731	0.868	0.860
2004	Bank of Communications	0.903	0.919	1.000	1.000	1.000
	Shenzhen Development Bank	1.000	1.000	1.000	1.000	1.000
	Qilu Bank	1.000	1.000	1.000	0.979	1.000
2005	China Construction Bank	1.000	1.000	1.000	1.000	1.000
	Bank of China	1.000	1.000	1.000	1.000	1.000
	Hua Xia Bank	0.963	1.000	0.956	0.881	0.909
	China Minsheng Banking Corporation	1.000	1.000	1.000	1.000	1.000
	Bank of Hangzhou	0.930	0.924	0.971	0.974	0.910
2006	ICBC	1.000	1.000	1.000	1.000	1.000
	Guangdong Development Bank	0.910	0.848	0.918	0.958	0.902
	Shanghai Rural Commercial Bank	0.813	0.939	0.882	0.867	0.899
	Bank of Ningbo	0.932	0.941	0.869	0.852	0.975
2007	China Merchants Bank	1.000	1.000	1.000	0.970	1.000
	China CITIC Bank	1.000	1.000	1.000	1.000	1.000
	Bank of Chengdu	0.796	0.916	0.899	0.939	0.965
	Bank of Chongqing	0.846	0.929	0.848	0.901	0.968
2008	Evergrowing Bank	0.725	0.686	0.895	0.867	
	Bank of Qingdao	0.989	0.823	0.788	0.750	
Mean		0.934	0.934	0.937	0.936	0.965

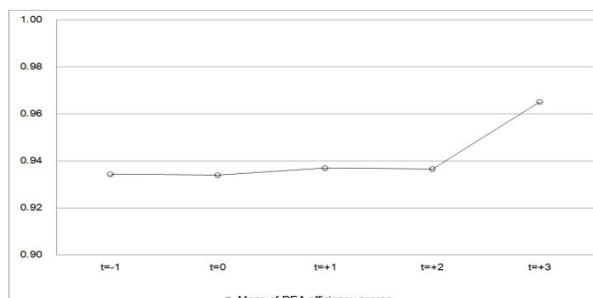


Figure 2: DEA Efficiency Change Over Time

**Productivity**

The change in productivity before and after FCI is analyzed using MI. As explained in §5.2.1, in this case, at least three years after FCI are required to anticipate change in efficiency over time. On the basis of this fact, MIs are calculated between the two points in time with a 3-year time lapse. Table 7 shows the number of panel samples compared in each MI calculation at each year of FCI. For example, in the case of  $t_1 = 2003 \rightarrow t_2 = 2006$ , the number of panel samples is 30. MIs are calculated by comparing those 30 panel samples between  $t_1 = 2003$  and  $t_2 = 2006$ . In particular, Table 7 and Figure 3. summarize the means of MIs regarding the 18 FCIBs from 2003 to 2007 in Table 5. Because the total mean of MIs is 1.047 throughout all the years, and all the means of MIs are larger than 1 except in the case of  $t_1 = 2006 \rightarrow t_2 = 2009$ , it can be argued that productivity progress was made after the 3-year time lapse after FCI. Furthermore, considering the Catch-up total mean = 1.008 and the Frontier-shift total mean = 1.037, the efficiency and the frontier (i.e., a set of the reference points for calculating the efficiency) had improved. In particular, the progress of outstanding FCIBs located on the frontier (i.e., "benchmark" DMUs) is the major component that enhances the MIs ( $1.037 > 1.008$ ). Compared with the benchmark FCIBs, the remainder of the FCIBs did not accomplish that much progress in efficiency. As a result, all Catch-up means are less than 1 except in the case of  $t_1 = 2003 \rightarrow t_2 = 2006$  with Catch-up mean =  $1.062 > 1$ . Meanwhile, from  $t_1 = 2006$  to  $t_2 = 2009$ , the mean of MIs = 0.972 indicates that productivity was greatly reduced during that time period. This can be interpreted that the Chinese banking industry degenerated based on the U.S. financial crisis of 2008 ( $t_1 = 2006 \rightarrow t_2 = 2009$  with Frontier-shift mean =  $0.982 < 1$ ). In terms of the years of FCI, the greatest increase in the productivity change occurred from  $t_1 = 2003$  to  $t_2 = 2006$ , which was closer to the initial stage of opening up the Chinese financial markets. Afterwards, the increments gradually decreased. However, the sharp decline in 2009 mentioned previously was recovered quickly in 2010 (MIs mean = 1.037 in the case of  $t_1 = 2007 \rightarrow t_2 = 2010$ ).

Table 7: Summary of the Means of MIs for Analyzing Change in Productivity over Time

Year of FCI	2003	2004	2005	2006	2007	Total
$(t_1 \rightarrow t_2)$	2003 → 2006	2004 → 2007	2005 → 2008	2006 → 2009	2007 → 2010	
Number of panel samples	30	31	37	41	54	
MI	1.133	1.050	1.041	0.972	1.037	1.047
Catch-up	1.062	0.998	0.995	0.994	0.993	1.008
	1.061	1.053	1.045	0.982	1.043	1.037

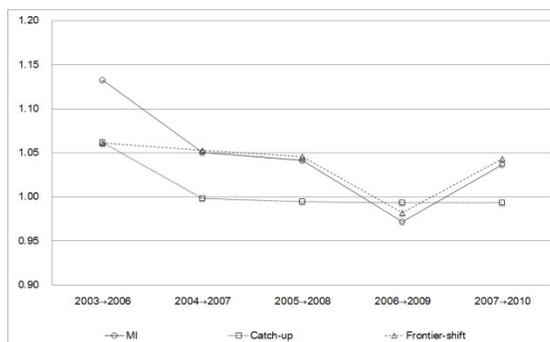


Figure 3: MI-based Productivity Change Over Time

**Determinant Factors for Productivity Change**

To identify determinant factors for the productivity change, Eq.(10) and Eq.(11) are estimated. In Table 8, among the independent variables, some correlation coefficients (r) are slightly higher than others. However, in Table 9, all variance inflation factors (VIFs) are less than 10, indicating no problem in the estimation due to the multicol linearity (Montgomery et al.<sup>33</sup>). In the regression analyses, the numbers of samples are n = 28 and n = 18 used in the estimates of Eq.(10) and Eq.(11), respectively. Based on the F-statistics such as 3.00\*\* and 5.45\*\*\*, the estimated regression equations have statistical significance.

Table 8: Descriptive Statistics of the Independent Variables

		Eq.(10)		(n = 28)			
Descriptive statistics	FCId	Grra	Maad	Earn	Liqu	Asqu	Caad
	x11	x2	x3	x4	x5	x6	x7
Mean	0.643	5.060	0.760	2.261	0.886	0.286	1.244
Standard deviation	0.488	4.367	0.166	3.009	0.137	1.866	1.350
Correlation coefficient (r)							
FCId	1.000						
Grra	-0.171	1.000					
Maad	0.295	-0.402**	1.000				
Earn	0.100	-0.247	-0.334*	1.000			
Liqu	-0.005	0.102	0.008	-0.105	1.000		
Asqu	-0.084	-0.179	-0.360*	0.186	0.153	1.000	
Caad	0.221	-0.014	-0.176	0.214	-0.022	0.038	1.000
Eq.(11)							
Descriptive statistics	FCIp	Grra	Maad	Earn	Liqu	Asqu	Caad
	x12	x2	x3	x4	x5	x6	x7
Mean	4.333	4.514	0.796	2.481	0.886	0.172	0.750
Standard deviation	2.080	2.230	0.157	3.450	0.102	2.337	0.102
Correlation coefficient (r)							
FCIp	1.000						
Grra	-0.173	1.000					
Maad	0.437*	-0.121	1.000				
Earn	-0.421*	-0.034	-0.653***	1.000			
Liqu	0.150	-0.065	-0.191	0.021	1.000		
Asqu	-0.046	-0.395	-0.460*	0.197	0.271	1.000	
Caad	-0.022	-0.117	-0.004	0.396	-0.069	0.102	1.000

\*, \*\*, \*\*\* indicate statistical significance at the significance level  $\alpha = 10\%, 5\%, 1\%$ , respectively.

Among the estimates of regression coefficients ( $\beta_i$ ) of Eq.(10),FCId (x11) is statistically significant and takes the positive(+) expected sign ( $\beta_{11} = 0.112^*$ ). Therefore, the productivity increase of FCIBs is larger than non-FCIBs', which is consistent with the results of the analysis in §5.1. In addition, three independent variables have statistically significant estimates with the expected signs: Maad (x3) ( $\beta_3 = -0.807^{***}$ ), Liqu (x5) ( $\beta_5 = 0.429^{**}$ ), and Asqu (x6) ( $\beta_6 = -0.035^{**}$ ). These results imply that productivity can be positively related to a lower cost-to-income ratio, higher liquidity, and a lower non-performing loan ratio. In particular, the fact that productivity is negatively correlated to the cost-to-income ratio accords with Bonin et al.<sup>34</sup> reporting foreign-owned banks are more cost-efficient than the other types of banks. On the contrary, Grra (x2) has a statistically significant negative (-) sign ( $\beta_2 = -0.025^{***}$ ). This can be interpreted that banks pursuing internal management soundness (e.g., enhancing the cost structure, securing liquidity, and strengthening asset soundness) are more likely to achieve productivity improvements compared with banks focused on the external size expansion.

Regarding Eq.(11), FCIp (x12) has the statistically significant positive (+) expected sign ( $\hat{\beta}_{12} = 0.028^{**}$ ), which verifies that the time lapse after FCI acts positively for improving productivity. This finding agrees with the results of the analysis in §5.2, and a certain amount of time is needed to realize the influence of FCI on improved productivity. The other two independent variables have statistically significant estimates with the expected signs: Maad (x3) ( $\hat{\beta}_3 = -0.454^*$ ) and Liqu (x5) ( $\hat{\beta}_5 = 0.535^{**}$ ). Consequently, to summarize the regression analyses in Table 9, FCI can improve productivity, but it requires a certain amount of time elapsed (approximately three years or longer) to exert its effect on changed productivity. Additionally, major determinant factors are enhancing the cost structure and managing liquidity.

Table 9: Summary of Regression Analyses

Independent variable	Eq(10)			Eq(11)		
	Estimate of $\hat{\beta}_i$	t-statistic	VIF	Estimate of $\hat{\beta}_i$	t-statistic	VIF
Intercept	1401 <sup>***</sup>	5.59		0.830 <sup>*</sup>	2.75	
FCIa(x11)	0.112 <sup>*</sup>	1.99	2.33			
FCIp(x12)				0.028 <sup>**</sup>	2.52	3.61
Gira(x2)	-0.025 <sup>**</sup>	-3.30	1.79	0.017	1.56	2.96
Maad(x3)	-0.807 <sup>**</sup>	-3.56	1.50	-0.454 <sup>*</sup>	-1.88	2.02
Eam(x4)	-0.007	-0.73	1.44	0.014	1.43	1.51
Liqu(x5)	0.429 <sup>**</sup>	2.31	1.24	0.535 <sup>**</sup>	2.55	1.51
Asqu(x6)	-0.035 <sup>**</sup>	-2.23	1.15	-0.013	-1.08	1.41
Caad(x7)	-0.016	-0.81	1.07	-0.057	-1.76	1.17
n	28			18		
adj-R <sup>2</sup>	0.341			0.647		
F-statistic	3.00 <sup>*</sup>			5.45 <sup>***</sup>		

## VI. CONCLUSION AND LIMITATIONS

The present study verified the following two major questions empirically using samples of 433 Chinese commercial banks with up-to-date data during the eight years from 2003 to 2010: (1) has the productivity of the banks changed after foreign capital inflow? and (2) if productivity change exists, what are its determinant factors? The present study used two methodologies, namely, DEA and MI. DEA was employed to measure efficiency, while MI was used to measure productivity change over time. Subsequently, regression analyses were conducted to identify the determinant factors. In the regression analyses, the MI-based productivity change is set to the dependent variable. For the independent variables, some typical financial ratios associated with the bank management were considered. In addition, two more independent variables were included to represent the presence of FCI and the time lapse after FCI. These are clear distinctions of the present study against previous studies in terms of dealing with the efficiency or productivity of Chinese commercial banks. The determinant factors are pinpointed with statistical significance in the dynamic analysis framework.

The major findings in the present study can be summarized as follows: (1) regarding efficiency, FCIBs are more efficient than non-FCIBs and LIFBs; (2) FCIBs require a certain amount of time lapse (approximately three years or longer) after FCI in order for FCI to exert an effect on productivity change. In particular, the progress of some outstanding FCIBs located on the frontier is the main driving force of the enhanced MIs; (3) from the regression analyses, two important determinant factors are identified enhanced cost structure and managing liquidity. Additionally, it is also confirmed that both the presence of FCI and the time lapse after FCI have a positive influence on improving productivity. Meanwhile, due to data limitation with some of the samples, the impact of the U.S. financial crisis of 2008 is not adequately controlled in this study. Also, in identifying the determinant factors, qualitative characteristics of the bank management (e.g., the governance structure) are not reflected. Therefore, in the future, further research should remedy those limitations.

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## The Influence of Emotional Intelligence and Satisfaction in Major on Mental Health among Nursing Students

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### Abstract---

**Background/Objectives:** The present study was a descriptive correlational study designed to examine the relationships among emotional intelligence, satisfaction in major, and mental health among nursing students.

**Methods/Statistical analysis:** The study was conducted between May 4 and June 7, 2016, during which time the content of the study was explained and questionnaires were completed. Emotional intelligence, satisfaction in major, and mental health were analyzed using Pearson's Correlation Coefficient. Linear regression was used to determine the factors influencing mental health in nursing students.

**Findings:** Nursing students' mental health was significantly correlated with satisfaction in major ( $r = -.26$ ,  $p = .001$ ) and emotional intelligence ( $r = -.24$ ,  $p = .004$ ). Satisfaction in major and age ( $r = .24$ ,  $p = .003$ ) were also significantly correlated. Satisfaction in major and emotional intelligence were factors significantly influencing mental health for these students, and they had an explanatory power of 10.6% for mental health.

**Improvements/Applications:** The study can provide basic data to develop nursing education that enhances the clinical practice capacities of nursing college students.

**Keywords---** Emotional intelligence, Mental Health, Satisfaction in Major, Nursing Students, Emotional Quotient.

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## I. INTRODUCTION

### A. *The Necessity for Research*

Nursing students are undergraduates preparing for a nursing career and must digest heavy study loads and a tough curriculum due to a number of major courses and training courses that are required. They face stress from both studying and job-seeking simultaneously<sup>1</sup>, so it is not easy for them to maintain good mental health. Nursing students should be mentally healthy so that they can become competent nurses who can cope with the dynamic and challenging real nursing clinical environment after graduation and understand patients and best assist with their needs. Therefore, the mental health of nursing students, as future nurses who will provide quality nursing to patients, is highly important. The content of nursing education to foster future nurses consists mainly of teaching knowledge and techniques. Conversely, nursing education alone will not suffice in managing mental health. Considering the essence of nursing practice, which emphasizes the nurse-patient relationship, it is necessary to give particular importance to emotional intelligence as a psychological factor closely related to mental health<sup>2</sup>.

It was Mayer and Salovey<sup>3</sup> who first applied the concept of emotional intelligence. They defined emotion as an ability to examine and adjust through cognitive thinking and emotional intelligence as an ability to examine and discriminate the emotions of one self and others in order to use the information in guiding one's own behavior and thinking. Goleman<sup>4</sup> made a considerable contribution in popularizing emotional intelligence. In his book, "Emotional intelligence," he defined Emotional Quotient (EQ) as a capability of individuals that motivates them to protect themselves, control impulses, and delay gratification in frustrating situations and helps them avoid suppressing rational thinking despite their current mood or stress, empathize with others, and not lose hope. Goleman<sup>5</sup> viewed the biggest difference between successful and unsuccessful performers in an organization as being their EQ-related capabilities. Individuals with high EQ were less stressed, were physically in good health, and showed a higher performance concerning management<sup>6</sup>. Many previous studies have reported that psychological well-being is related to emotional clarity<sup>7</sup>, psychological happiness to emotional intelligence<sup>8</sup>, conflict resolution style to emotional intelligence<sup>9</sup>, mental health to assertiveness<sup>10</sup>, and mental health to emotional intelligence<sup>2,11</sup>.

Job satisfaction influences the quality of job performance. Some studies have reported that the job satisfaction of nurses influences the quality of their job performance<sup>12</sup>, and the job satisfaction of nurses influenced mental health<sup>13</sup>. In the case of college students, one study reported the correlation between life satisfaction and mental health of college students<sup>14</sup>. As nursing students can also concentrate on their study without mental conflict concerning their path depending on the degree of their satisfaction in major, the satisfaction in major of nursing students can be considered to be influential in relation to mental health.

As discussed above, emotional intelligence and satisfaction in major are factors considered to be highly influential to the mental health of nursing students becoming engaged in clinical practice. However, previous studies on nursing students have not yet sufficiently investigated the effect of emotional intelligence and satisfaction in life on mental health. Therefore, our study investigated the effect of the emotional intelligence and satisfaction in major of nursing students on their mental health in order to provide basic data to develop programs for managing and improving mental health of nursing students.

### B. *Purpose of Study*

The purpose of this study was to determine the relationships among emotional intelligence, satisfaction in major, and mental health of nursing students. The detailed purposes were as follows.

- 1) Determine the general characteristics of the participants.
- 2) Determine the correlations among emotional intelligence, satisfaction in major, and the mental health of the participants.
- 3) Determine the influence of emotional intelligence and satisfaction in major on mental health.

## II. STUDY METHOD

### A. Study Design

The present study was a descriptive correlational study designed to examine the relationships among emotional intelligence, satisfaction in major, and mental health among nursing students.

### B. Participants

Participants in this study were 154 junior students from a nursing department of 2 different universities based in D city. The study was conducted between May 4 and June 7, 2016, during which time the content of the study was explained and questionnaires were completed. The sample size was calculated using G\*Power 3.1.9.2<sup>15</sup>. Based on 15 linear multiple regressions with the effect size .35, significance level of .05, and power of test of .95, the sample size calculated was larger than the recommended size of 80; thus, it satisfied the requirement. Out of 154 questionnaires, copies with unreliable answers or missing data for main assessment variables were excluded. A total of 150 copies (97.4%) were utilized for final analysis.

### C. Instruments

#### *Emotional Intelligence*

Emotional intelligence was measured using 20 questions on the checklist by Moon<sup>16</sup>. This tool is a self-reporting test on situation-based performance developed for adults and consists of emotional perception, emotional expression, empathy, emotional regulation, and emotional utilization. For all questions, one option should be chosen out of 4. Each option had different points assigned from 0, 5, 10, and 20 points, and each question had a different scoring criterion. A higher total score was better. A score of 204 was considered to be low, 205~264 to be moderate, 265~309 to be high, and 310 or higher to be very high. Cronbach's  $\alpha$  for each branch was presented in Moon's study as follows:  $\alpha = .75$  for emotional perception,  $\alpha = .77$  for emotional expression,  $\alpha = .80$  for empathy,  $\alpha = .76$  for emotional utilization, and  $\alpha = .85$  for emotional regulation<sup>16</sup>. Cronbach's  $\alpha$  in this study was .681.

#### *Satisfaction in Major*

Satisfaction in major is a self-reporting tool that assesses the subjective experience of participants and demonstrates considerably high reliability, validity, and sensitivity if used properly<sup>17</sup>. It was measured with a 10-point visual analogue scale.

#### *Mental Health*

The General Health Questionnaire (GHQ) is a self-reporting inventory developed by Goldberg and Hillier<sup>18</sup> for discrimination and early detection of mental illnesses in normal adults. The inventory questions respondents on how their psychological state changed over the last 2 to 3 weeks compared to the usual state when they feel normal in order to detect the problems in their current state. It originally consisted of 60 questions, but our study applied the simplified version of 12 questions translated by Park et al.<sup>19</sup>. The GHQ-12 has a structure consisting of 2 factors, "depression and anxiety" and "social dysfunction." A higher score means stronger psychological distress.

In this study, a Likert scale was applied to test the factor structure of the GHQ-12, and the affirmative questions (questions 1,3,4,7, and 12) were inversely scored. In a study by Picardi et al.<sup>20</sup>, the test-retest reliability of one-week interval was 0.72, and Cronbach's  $\alpha$  was .88. The Cronbach's  $\alpha$  in this study was .736.

### *Analysis*

Data were analyzed using SPSS/WIN 21.1.

- 1) The general characteristics of the participants were analyzed using descriptive statistics.
- 2) Emotional intelligence, satisfaction in major, and mental health were analyzed using Pearson's Correlation Coefficient.
- 3) Linear regression was used to determine the factors influencing mental health in nursing students.

### III. STUDY RESULTS

#### A. General Characteristics of the Participants

The general characteristics of the participants were as follows: 134 participants were under 22 years old (77.9%), 33 were over 23 years old (22.1%), and the number of female participants was 134 (89.3%). In terms of religion, 99 people had none(66.0%) (Table 1).

Table 1: The General Characteristics of the Subjects

(N = 150)

Characteristics	Categories	N(%)	Mean(SD)
Age(year)	19-20	61(40.6)	21.72(2.89)
	21-22	56(37.3)	
	23-24	17(11.3)	
	25-30	13(8.7)	
	31-40	3(2.1)	
Gender	Male	16(10.7)	
	Female	134(89.3)	
Religion	None	99(66.0)	
	Protestant	29(19.3)	
	Catholic	9(6.0)	
	Buddhism	8(5.3)	
	Others	5(3.4)	
Motivation of Admission	Employment	64(42.7)	
	Advice of people	31(20.7)	
	Aptitude	29(19.3)	
	School grades	15(10.0)	
	Spirit of service	5(3.3)	
	Others	6(4.0)	

#### B. Level of Emotional Intelligence

The average emotional intelligence of nursing students was 207.27(49.63) and belonged to the moderate level (Table 2).

Table 2: The Level of Emotional Intelligence

(N = 150)

Variable	Categories	N(%)	Mean(SD)
Emotional Intelligence	~204	69(46.0)	207.27(49.63)
	205~264	61(40.7)	
	265~309	16(10.7)	
	310~	4(2.7)	

#### C. The Level of Satisfaction in Major

The average level of satisfaction in major of nursing students was 7.01(1.57)(Table 3).

Table 3: The Level of Satisfaction in Major

(N = 150)

Variable	Categories	N(%)	Mean(SD)
Satisfaction in Major	Very unsatisfied	2(1.3)	7.01(1.57)
	Unsatisfied	9(6.0)	
	Usually	62(41.3)	
	Satisfied	65(43.4)	
	Very satisfied	12(8.0)	

**D. Correlation Analysis**

Nursing students' mental health was significantly correlated with satisfaction in major ( $r = -.26, p = .001$ ) and emotional intelligence ( $r = -.24, p = .004$ ). Satisfaction in major and age ( $r = .24, p = .003$ ) were also significantly correlated (Table 4).

Table 4: Correlation among Variables

(N = 150)

Variables	1)r(p)	2)r(p)	3)r(p)	4)r(p)
Mental Health <sup>1)</sup>	1			
Emotional Intelligence <sup>2)</sup>	-.24(.004)**	1		
Satisfaction in Major <sup>3)</sup>	-.26(.001)**	.42(.066)	1	
Age <sup>4)</sup>	-.00(.961)	-.05(.530)	.24(.003)**	1

\*\* :  $p < .01$ , \* :  $p < .05$

**E. Regression Analysis**

The Durbin-Watson statistic was 2.14, which was close to 2, and there was no autocorrelation of the error terms. The correlation between independent variables was 0.8 or lower. The variance inflation factor (VIF) was 1.004, not exceeding 10. Therefore, there was no multicollinearity between independent variables.

To identify the explanatory power of factors related to mental health, a linear regression analysis was conducted with mental health as the dependent variable and with satisfaction in major and emotional intelligence as the independent variables.

Satisfaction in major ( $\beta = -.250, p = .002$ ) and emotional intelligence ( $\beta = -.220, p = .005$ ) each had a significant influence on mental health with an explanatory power of 10.6% (Table 5).

Table 5: Predictors of Mental Health

(N = 150)

Variables	$\beta$	p	Adj.R <sup>2</sup>	F(p)
Emotional Intelligence	-0.22	.005*	0.106	9.849(.000)
Satisfaction in Major	-0.25	.002*		

\*\* :  $p < .01$ , \* :  $p < .05$

**IV. DISCUSSION**

The emotional intelligence of the participants measured with the emotional intelligence examination checklist developed by Moon<sup>16</sup> in this study was 207.27, which is a moderate level of emotional intelligence. In the study by Choi and Son<sup>21</sup>, the participants also demonstrated a moderate level of emotional intelligence, and the study of adolescents by Yoo<sup>2</sup> also reported the emotional intelligence of participants as moderate, showing results similar to ours. On the other hand, the study of nurses by Seong<sup>22</sup> reported that their emotional intelligence level was moderate-high, showing that nurses had quite higher emotional intelligence than adolescents or college students. Considering the context of clinical fields where nurses are required to understand and form bonds with patients, nurses are thought to professionally develop emotional intelligence. Therefore, departmental efforts for improving the emotional intelligence of nursing students who will eventually work at various clinical fields holds a great significance as part of fostering nursing qualities required in their future clinical practice.

The satisfaction in major in this study was 7.01 out of 10, which showed a result quite similar to the score of 7.38 in the study by Kim and Yun<sup>23</sup>. Students with high satisfaction in major feel satisfied with their student life, and this leads to positive mental health.

In this study, emotional intelligence and satisfaction in major showed a significant correlation with mental health, and this was similar to the result of a study by Chung<sup>11</sup> in which emotional intelligence and optimism were positively correlated with mental health. Individuals with high emotional intelligence have a good understanding of themselves and others, good empathizing ability, and a high level of life satisfaction; therefore, emotional intelligence showed a positive correlation with mental health. In a study by Lee<sup>24</sup>, emotional expression, the sub-factor of emotional intelligence, was positively correlated with ego, the sub-factor of mental health, and negatively correlated with psychopathology, another sub-factor of mental health.

Satisfaction in major had a correlation with age among the general characteristics of the participants. Older participants tend to have higher satisfaction in their nursing major. Their satisfaction in major probably demonstrated a high rate because the majority of older nursing students have a relatively lower pressure for job-seeking compared to other majors.

In this study, emotional intelligence and satisfaction in major influenced mental health, and the explanatory power was 10.6%. A study by Yoo<sup>2</sup> also showed that 4 out of 5 sub-factors of emotional intelligence influenced mental health and reported that emotional perception had a greatest influence on mental health among the sub-factors. A study by Kim<sup>25</sup> showed that the level of emotional intelligence of gifted children had a significant influence on their mental health, and Kim<sup>26</sup> concluded that emotional regulation and understanding of one's own emotions had a positive influence on mental health. Based on our study results, measures for improving emotional intelligence are no doubt crucial nursing interventions for positive mental health. Therefore, intervention programs designed to enhance emotional intelligence for enhancement of the mental health of nursing students will certainly contribute to nursing students' adaptation to future clinical practice. The influence of emotional intelligence and satisfaction in major was 10.6% in this study, which was quite low, and it is probably because certain factors influencing mental health were not included in the analysis. Therefore, replication is recommended to investigate the correlation and impact of the sub-factors of emotional intelligence including personal characteristics of participants and social variables in future studies. This study investigated the influence of emotional intelligence and satisfaction in major on mental health and offers valuable basic data, which provide a foundation for developing intervention programs for improving mental health.

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## Psychological and Emotional Capacity Strengthening Program Development and Effectiveness Study for Independence of Single Mothers with Children

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### Abstract---

**Background/Objectives:** rewrite objectives the purpose of this program is for single mothers to improve confidence about roles as parents and strengthen personal capacity to have a sense of independence through the processes of self-exploration, child nurturing method learning, and making relationships with regional society. This program approached from an ecological system perspective and in the perspective that single mothers with children are exposed to various harsh environments and adopt in various ways, and in that their lives are influenced by continuous instruction with the environment, this perspective was chosen.

**Methods/ analysis:** As the first stage of the study, literature review on single mothers with children was conducted. Next, interviews were conducted on five single mothers with children living in Cheon-an, one of the representative cities in the Korean central region to investigate and analyze program demand. Based on literature review and investigated demand, in the third stage, a five session program with the goal of promoting psychological and emotional stability to promote independence of single mothers with children was developed. Finally, the program developed for single mothers with children was operated and conducted and the program effectiveness was analyzed. The developed 5 session program was progressed for five weeks from July 2015, 1 session a week, the verification of effectiveness was done through qualitative research for the five person small-group and the perceived personal changes were figured out through interviews after the end of each session and program.

**Findings:** The reason the name of this program is 'The wings of mothers' is because mothers must be wings for children and for the three possible mothers must have strength and the significance is in the hope that the program content will help the strong wings of mothers. Upon the interview results to understand the needs on this program, it was shown that unmarried mothers wanted to develop the relationship and the communication skills such as relationship building with others, communication with communities, and so on. To live the independent and autonomous life, nurturing unmarried mothers wanted to build the relationship with surrounding environment first, therefore, the programs was developed with building relationships with families and communities based on this. Ecological viewpoints were used as the theoretical basis of this program. In the result of the analysis of changes by session of the program participants, it became a chance for them to clearly figure out themselves and through honest communication with single mothers with children in similar conditions, the created a sense of togetherness and stated that the gained confidence. Also for them it became a chance to realize that they are not problematic people but independent women and a chance to seriously think about what kind of parent they must be for their children and was found they had created motivation to pioneer life as an independent single mother with children.

**Improvements/Applications:** In the verification of the program effectiveness, with the progression of the program sessions personal self-esteem increased and independence improved, and increase of quality of life could be expected. It is expected that these results will be useful for increase in independence motivation during development and operation of single mother related programs in the future and as a basis for effective fundamental data necessary in subject perspective programs and provision of practical service.

**Keywords---** Capacity Strengthening Program, Single Mothers with Children, Independence, Ecological System Perspective, Subject Perspective.

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## I. INTRODUCTION

While recently single mothers choosing to raise their children after birth are increasing<sup>1</sup> and even if in the Single Parent Family Support Act it recognizes them as subjects of assistance, until now, research about single mothers have been conducted focusing on institutions. The reality is that there is almost no basic or systematic data about local society single mothers who give birth and raise their children without help from institutions<sup>2</sup>. In an investigation that figured out the number of single-parent families, it estimates through the ratio of single mothers and fathers and the number of single-parent families increased from 1594 in 2000 to 1749 in 2014, and it is shown that among them, 11.6% of them are families of single fathers or mothers<sup>3</sup>. Many single mothers that chose to raise their children experience financial burden and parenting stress as the provider and over the prejudice due to social stigma, they live as mothers. While there have been social changes that mediate relatively open compared to the past with the diversity of lifestyles and families, still, women who live as single mothers raising their children or blocked by social prejudice and it has negative effect on the single mother as well as her children and the family. Although it is being said that social tolerance towards sexual relations before marriage is increasing, the branding of deviance of sexual and family norms on single mothers due to pregnancy and birth by sexual relations before marriage and when they choose to raise her children<sup>4</sup>. Especially for teenage single mothers, they experience nested discrimination and prejudice for being a woman that was pregnant and gave birth without being married, along with the negative views of underage sexual experience and if they decide to raise their children, they will experience continuous difficulties. Studies about single mothers with children mainly consisted of roles as mothers and support plans, including livelihood study of single mothers with children<sup>5,6,2,7</sup>, study of support plans for single mothers with children<sup>8,9,10</sup>, study about the parenthood and maternity of single mothers with children<sup>11,12,13</sup>. Final goal of all research for single mothers with children can be said to be children and single mother focused welfare, thus the pursuit of happiness of subjects and independence for this is crucial. In an era of low birth rate problems and increase of diverse family forms, thinking about children who are the future generation, there are plenty of reasons to relieve labeling and prejudice against single mothers who have clear intentions to raise their children without giving up.

Therefore this program was started as a part of a comprehensive program to prepare positive attitude to minimize social labeling and prejudice of single mothers with children and independence of subjects. This program that was planned for the purpose of promoting psychological and emotional stability and confidence of single mothers with children is a part of the HAPPY MOM business and the name of the program is "wings of mothers". This program approached from an ecological system perspective and in the perspective that single mothers with children are exposed to various harsh environments and adopt in various ways, and in that their lives are influenced by continuous instruction with the environment, this perspective was chosen. According to this perspective, the content was composed where for intermediate system, regional society, for micro system, relationship with family including self and children was focused on.

In more detail, the program is composed of a total of 5 sessions, making relationship with myself (1 session), making relationship with children (2 sessions), and making relationship with regional society (2 sessions), and it was conducted with five people in a group so that the dynamism of small groups will be maximized. The purpose of this program is for single mothers to improve confidence about roles as parents and strengthen personal capacity to have a sense of independence through the processes of self-exploration, child nurturing method learning, and making relationships with regional society.

## II. METHOD

### A. Research Process

This study was selected the program development method of the small groups in the previous study<sup>14</sup>.

As the first stage of the study, literature review on single mothers with children was conducted.

Next, interviews were conducted on five single mothers with children living in Cheonan, one of the representative cities in the Korean central region to investigate and analyze program demand. Based on literature review and investigated demand, in the third stage, a five session program with the goal of promoting psychological and emotional stability to promote independence of single mothers with children was developed.

Finally, the program developed for single mothers with children was operated and conducted and the program effectiveness was analyzed.

### B. Data Processing and Analysis Methods

The developed 5 session program was progressed for five weeks from July 2015, 1 session a week, with the basic content of making relationships with microenvironment to local society environment for promotion of psychological and emotional stability of single mothers with children.

A total of five people participated in the program, the age range from 21 to 36, and the raising 1 to 2 children in table 1.

To find out about the performance of the program, program objective related variables were selected to conduct effectiveness verification.

The verification of effectiveness was done through qualitative research for the five person small-group and the perceived personal changes were figured out through interviews after the end of each session and program.

Table 1: Participant Information

Subject	Age	Education history	Occupation	Number of children (age)	Child's school stage
A	27	High school graduate	None	1(10 months)	-
B	21	Middle school dropout	None	2(51 months, 33 months)	-
C	36	University graduate	None	1(8 years)	Second year elementary
D	23	High school graduate	None	1(6 months)	-
E	22	High school graduate	Office worker	1(4 years)	-

## III. STUDY RESULTS

### A. Program Development

The content of the program developed in the study is shown in table 2.

Table 2: Wings of Mothers Program Overview

Session	Program name	Program objectives	Program content
1	Making relationship with myself	Through a process of exploring oneself, one's own strengths and weaknesses are clearly figured out and preparation for personal capacity strengthening can be done.	-Interviewing each other -Expressing my current self -Identifying real needs through real need profile
2	Making relationship with children 1	It is a time for exploring methods to make relationship with the children and to diagnose oneself as a nurturer	-Showing yourself as a mother -Creating a list of resources you can get to the child -Showing your weaknesses and strengths
3	Making relationship with children 2	Exploring ideal parent child relationship and establishing personal parent image	- Exploring personal ideal parent child relationship and establishing personal parent image
4	Making relationship with local society 1	Recognizing the meaning of living within a local society and learning methods to network with local society	-Resource exploration of surroundings and local society -Personal local network level exploration and psychological and emotional connection exploration
5	Making relationship with local society 2	Exploring local society with children and learning to live amongst neighbors	- Exploring local society with children and configuring coexistence method

The first cycle consists of interviewing each other with 'making relationship with oneself,' expressing oneself, and seeking one's desires by the current desire profiles. In the second and third cycles, they prepare the time to seek the methods to make the relationship with the sons and daughters with two steps; to diagnose oneself as the parents; to investigate the desirable relationship between parents and children; and to establish the individual role model of parents. In the fourth and fifth cycles, they acknowledge the meaning of living together in the community with 'making relationship with community,' and acquire the methods to search the community and to network with them. By the time to seek oneself, they can understand their own strengths and weaknesses well and prepare to enhance their individual competency. The reason the name of this program is 'The wings of mothers' is because mothers must be wings for children and for the three possible mothers must have strength and the significance is in the hope that the program content will help the strong wings of mothers.

The goal of the program is nurturing psychologically and emotionally stable mothers with increased motivation of independence and implementing independent life through the program of five sessions of relationship making including the mothers themselves, family, neighbors, and local society.

### ***B. Program Effectiveness Verification***

In the result of the analysis of changes by session of the program participants, it became a chance for them to clearly figure out themselves and through honest communication with single mothers with children in similar conditions, they created a sense of togetherness and stated that they gained confidence.

Frankly speaking, there have been programs or educational courses like this, and I had little expectation on these. That was my first thought. The other educational courses so far were just to listen. It seems to be the first time to talk about our stories for a long time like this. Though there are many acquaintances here among the participants, we have never had the time to talk about our stories such a long time openly. I can understand how other people live from the conversations and I can think about how I have to live. Surely, they seem to be in the same situation, and strong intention was raised to help each other (participant C).

Seems to be the enemies here and there. Man, his parents, my company problems... I wish to be confident upon working hard. Because of many conflicts, broken relationships... Since I heard from the sisters who overcame the problems well, it seems that I could be better. Anyway, it doesn't look like gloomy situation so I can breathe somewhat. I can understand a little bit how I approach them, how I behave in the relationships with others, and so on (participant E).

Also for them it became a chance to realize that they are not problematic people but independent women and a chance to seriously think about what kind of parent they must be for their children and was found they had created motivation to pioneer life as an independent single mother with children.

I hope they do not see us as the unusual women but as the responsible people who give birth of children and raise them well. In fact, there are many cases of abortions and giving up the babies. But we are the mothers who keep and raise our babies until the end. Frankly speaking, we know we have to consider this first, but we forget it so frequently due to the hard work. Then, we feel guilty to the babies. From this opportunity, I decided not to do that anymore for my baby. Above all, I thought I would be a dignified mother (participant B).

Since I had difficulty in expressing myself to others, I only kept the existing relationships with my friends and past acquaintances, and anger to the parents. I thought my children would be the same as the others if I met the others well. I cared for what I looked like from the others. Frankly, I would like to be shown better. I didn't know how to react and I know what I show (participant D).

I only received the goods and economic support, it was good, but... Unknowingly, I care for those, At the moment, it is good because it is needed. Without these, I wish I could do by myself, but I don't know how to do it. Time passes. For us, we don't know what we have to do. Nobody volunteers the leader position... Just... But it doesn't mean to ask someone doing something but I have to prepare what I want well. Something different from now. More confident, more aggressively (participant A).

## **IV. CONCLUSION**

In the verification of the program effectiveness, with the progression of the program sessions personal self-esteem increased and independence improved, and increase of quality of life could be expected.

For the participants it became a chance for them to honestly reveal themselves to develop confident and strong self-image, and in this process the educational meaning of growth and development of single mothers with children could be found.

This positive effect, unlike previous single mother programs dealt with within social prejudices, is a result of single mothers themselves participating in a program dealing with making relationships with surrounding environments for independence by themselves and through this, changes in attitude towards relationships with environment and a broader understanding about themselves.

It is expected that these results will be useful for increase in independence motivation during development and operation of single mother related programs in the future and as a basis for effective fundamental data necessary in subject perspective programs and provision of practical service.

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## Depression and Health Behavior of Middle-aged Women

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### Abstract---

**Background/Objectives:** This study is descriptive research conducted to investigate the levels of depression and health behavior depending on the general characteristics of middle-aged women and understand the relationship between depression and health behavior of the subjects.

**Methods/Statistical analysis:** The subjects of this study were 196 middle-aged women living in one metropolitan area who were selected by the convenience sampling method. Data collection was conducted from April to August in 2015, and written consents were obtained from the subjects who voluntarily agreed to participate in the study. The collected data were computerized using the SPSS/PC program (SPSS, Inc., Chicago, IL), and real numbers, percentages, means, standard deviations, and minimum and maximum values were calculated concerning the general characteristics of the subjects, and their levels of depression and health behaviors. The correlation between depression and health behavior of the subjects was analyzed using Pearson's correlation.

**Findings:** The mean score of depression of the subjects was 4.55 points, and the mean score of health behavior was 3.03 points. For the depression and health behavior depending on the general characteristics of the subjects, it was found that the more satisfied a person was with the economic status, the lower the score of depression was and the higher the score of health behavior was. In addition, it was also found that the higher the satisfaction with the family was, the lower the score of depression was and the higher the score of health behavior was. For the correlation between depression and health behavior, the study results showed that the lower the score of depression was, the better health behaviors were performed.

**Improvements/Applications:** Effective intervention programs should be developed to improve the health of middle-aged women and further research is required to provide the basic information which can serve as the basis for the development of the programs.

**Keywords---** Depression, Health Behavior, Middle-Aged Women.

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## I. INTRODUCTION

Middle age refers to the adult stage just before the start of old age and the period of the ages from 40 to 60<sup>1</sup>, and women generally experience menopause during this period. Menopause means the loss of women's reproductive function as a result of the decrease of the ovarian function and the transition to old age<sup>2</sup>. As the ovarian function declines with the initiation of the menopausal period, menstrual cycles and the amount of menstrual discharge become irregular, and the secretion of estrogen is reduced over the years. The decrease in estrogen causes malfunction of the autonomic nervous system by acting on the autonomic center. As a result, middle-aged women experience changes in body functions and reproductive functions, such as facial flushing, abdominal distension, limb numbness, back pain, joint pain, sweating, and dyspareunia, and these changes lead to emotional and psychological changes, such as memory loss, poor concentration and judgment, nervousness, and depressed mood, which result in the disappearance of motivation and enthusiasm and tendency of depression<sup>3,4,5</sup>. Depression accounts for a large proportion of the emotional problems of middle-aged women, and the prevalence of depression was reported to be two times higher in women than in men, and depression in middle-aged women was reported to be related to menopausal symptoms<sup>6</sup>.

Health promotion behavior refers to the activities performed to increase the level of well-being of an individual or group, and maintain and enhance personal self-realization or accomplishment<sup>7</sup>, and it is regarded as a major factor in the prevention of chronic diseases through the correction of lifestyles<sup>8</sup>. Considering the fact that chronic diseases such as high blood pressure and diabetes and menopausal symptoms of middle-aged women increase from the age of 40, middle-aged women's performance of health promotion behaviors is very important. Increased life expectancy has made it very important to prepare for the life of old age in middle age, and the physical, physiological and psychological symptoms in middle age are highly correlated with the health status<sup>3</sup>. Therefore, this study aimed to present the basic data for establishing the policies and systems to improve the quality of life of middle-aged women by identifying the relationship between depression and health behavior of middle-aged women.

## II. LITERATURE REVIEW

The period of middle age is arbitrarily defined to such a degree that the definition varies greatly among individuals, but physiological and psychological changes that middle-aged men and women experience are very noticeable<sup>9</sup>. This period is the time when people generally have fulfilled personal achievements to some extent, have attained social stability and experience a sense of emotional security. On the other hand, people also feel the psychological pain such as worries about the future, loss of purposes and directions, fears about the new changes, depression and loneliness during this time of life<sup>2</sup>.

Middle age is a time of transition into a new period of life when people go beyond the peak of physical maturity, the normal aging phenomenon gradually appears, and they go into a new period of life associated with a severe chaos of selfhood accompanied by emotional instability. Looking back on the past life leads to great changes in the ability to think and physical states, and as a result, the way of life also undergoes changes. This period is accompanied by the reduction of prospects for time and increase in introversion, so people go through the reconsideration on the first half of life and reevaluation of their lives and suffer conflict and confusion. In addition, a midlife crisis comes accompanied by psychological upheaval and increasing pain<sup>10</sup>.

These changes occurring in middle age are associated with menopause for women. Middle-aged women undergo physical and physiological changes due to decrease in ovarian function and menopause, experience the process of reorganization of the family structure caused by the change of their roles in their family due to their children's growth, marriage or finding employment, and experience not only stress, anxiety, depression, loneliness, and a sense of crisis but also emotional and psychological problems such as a sense of isolation and low self-esteem. It is also common that they experience depression due to various psychological and social changes, including changes in their roles as a result of getting older and the retirement of the spouse<sup>11</sup>.

Especially, middle-aged women were shown to experience more depression symptoms than middle-aged men during the same period of life, which was attributed to the fact that they do not accept menopause as a natural part of life but tend to think of it as the loss of youth and a crisis in life and the society which expects and forces women to accept and endure more unfairness than men in the society only because of their gender, and the cultural background<sup>12</sup>. Most of the middle-aged women were found to generally perceive their lives negatively<sup>13</sup>. In this regard, it is necessary to focus on the fact that the negative physical and psychological symptoms experienced by women in association with the menopause do not occur simply because of the reduction in estrogen but they are affected by a variety of external factors, such as the relationship with the spouse, education level, stress, and monthly income<sup>14</sup>.

Several previous studies showed that the marriage life with the spouse played an important role in the health of middle-aged women, and that the more intimate the relationship with the spouse was, the less likely they were to experience social isolation and depression<sup>15</sup>. It was also reported that the higher the satisfaction with the spouse was during marriage life, the lower the level of depression was, and mental and psychological factors were more likely to affect and cause serious menopausal symptoms than physical causes<sup>16</sup>.

Middle-aged women's depression is attributed to diverse factors, such as anxiety about physical and physiological changes, role conflict due to the independence of their children, a sense of deprivation, loss of self-identity, and a crisis of self-consciousness. The incidence of depression is increased by their feelings of emptiness and alienation caused by the sense of being left out or ignored due to their children's growth and their husbands' activities outside their home<sup>17</sup>.

It was reported that middle-aged women's depression occurred more frequently in the 50s than in the 40s, and its incidence was higher when the educational attainment was lower, when the satisfaction with income was moderate, and when they did not think they were healthy according to the subjective evaluation of their health status<sup>17,10</sup>.

As described above, middle-aged women are faced with a variety of health problems of a transitional period of life, but they typically do not practice preventive activities for their health care because of their children's education, parenting, responsibility for elderly parents, and retirement preparation, and working women are more likely to neglect the need for health care since they have to assume additional roles required by the workplace and the society<sup>18</sup>.

Increased average life expectancy makes it very important to prepare for the life of old age in middle age. In South Korea, middle-aged women's menopause-related symptoms have been reported as a major factor in menopausal adjustment disorders, accounting for about 50% of health problems<sup>18</sup>, and it was reported that the physical and physiological symptoms and health status in middle age including menopausal syndrome was highly correlated with depression<sup>19</sup>.

Deek & McCabe<sup>13</sup> claimed that menopausal symptoms of middle-aged women should be understood from an integrated perspective including psychological aspects, and that a variety of factors related to menopausal symptoms should be included in health promotion strategies when dealing with the health problems of middle-aged women.

According to Pender's Health Promotion Model, an individual's biological, psychological, and socio-cultural factors affect behavior characteristics and emotions with respect to variables affecting health promotion behavior, and interpersonal and situational factors as well as perceived benefits, perceived barriers, and self-efficacy for the behavior influence the behavior plan. In other words, it can be seen that personal factors affect health promotion behavior in addition to cultural and environmental factors<sup>3</sup>. Health behavior in everyday life is an important supplementary element of a healthy lifestyle, reduces an individual's risk for diseases and enables a person to move in the direction of increasing personal well-being, self-realization, and personal satisfaction. Therefore, it is desirable to encourage health promoting behaviors in

everyday life and as the level of health promoting behavior is increased, it is more likely to act as an important positive factor in determining physical and psychological health and quality of life<sup>20</sup>.

For middle-aged women, it was reported that the higher the educational attainment was, the more religious they were, and the higher the economic status was, the more health-promoting lifestyles they tended to perform, and that exercise was reported to be the most neglected area of health promoting behaviors.

It was also found that although middle-aged women were very interested in health promotion, they tended to practice fewer healthy behaviors<sup>21</sup>.

The health care of middle-aged women has a great influence on the health status in old age, and adequate health care in middle age is essential for preparing healthy old age life.

As the awareness that health care in middle age is important for living a healthy life during extended old age is increased, there is a growing trend toward health promotion efforts for living a healthy and happy life in middle age and increasing interest in the quality of the middle-age life and a happy life<sup>20</sup>.

The value of health promotion behavior is that it makes it possible to achieve psychological well-being and self-fulfillment by exerting the potential of individuals, families, and communities to the greatest extent in addition to extending the lifespan by preventing illness and physical symptoms of aging. Therefore, it is important to develop desirable habits of various actions that can play a positive role in health in order to improve the health of middle-aged women<sup>20</sup>.

### III. PROPOSED WORK

Depression refers to an emotional state including anxiety, gloomy feelings, and a sense of failure, helplessness and worthlessness, which ranges from normal mood changes to a pathological condition<sup>22</sup>, and this study was conducted using a shortened form of the depression scale of Seikh & Yesavage<sup>23</sup>, which was used in Choi, Kim, Chae, Jeon, & You<sup>24</sup>. The measurement tool used was a dichotomous scale consisting of a total of 15 binary items (Yes=1, No=0), the score ranged from 0 to 15 points, and a higher score indicated more severe depression. In Choi et al.<sup>24</sup>, Cronbach's  $\alpha = .83$ , but in this study, it was 0.78

Health behavior is defined as individuals' activities to maintain personal health, and maintain and promote physical functions<sup>25</sup>, and this study used the health behavior assessment tool developed by Choi & Kim<sup>26</sup>. This tool consisted of a total of 33 questions and a 4-point scale, the score ranged from 33 points to 132 points, and a higher score indicated a higher degree of health behavior. For the reliability of the tool, the value of Cronbach's  $\alpha$  was .91 at the time of its development, and it was 0.92 in this study.

The results of this study are as follows:

- 1) The scores for depression and health behavior of the subjects are shown in Table 1. The mean score for depression was 4.55 points and the mean score for health behavior was 3.03 points.
- 2) The levels of depression and health behaviors according to the general characteristics of the subjects are shown in Table 2. It was found that the higher the satisfaction with the economic status was, the lower the score of depression was ( $t=-3.62$ ,  $p=.000$ ) and the higher the score of health behavior was ( $t=2.17$ ,  $p<.03$ ). In addition, as the satisfaction with the family life was increased, the score of depression was decreased ( $t=-4.08$ ,  $p=.000$ ) and the score of health behavior was increased ( $t = 2.99$ ,  $p <.01$ ).
- 3) For the correlation between depression and health behavior of the subjects, it was shown that the lower the score of depression was  $t = -4.08$ ,  $p=.000$ , the better health behaviors were performed ( $r=-4.04$ ,  $p=.000$ ).

Table 1: Depression and Health Behavior by General Characteristics of Subjects

(N=196)

Characteristics	Categories	N (%)	Depression	t or F	Health behavior	t or F
			M±SD	(p)	M±SD	(p)
Age	36~40	13(6.6)	3.95±3.83	.60	2.85±.25	1.67
	41-50	130(66.3)	4.45±3.36	(.54)	3.04±.36	(.19)
	51~	53(27.1)	4.93±3.25		3.05±.37	
Religion	Have	132(67.5)	4.04±3.42	.71	3.06±.38	1.33
	Not have	64(32.5)	4.79±3.22	(.47)	2.98±.31	(.18)
Education	Middle school(a)	23(11.7)	5.86±3.38	2.02	2.90±.30	1.58
	High school(b)	110(56.1)	4.35±3.30	(.13)	3.05±.38	(.20)
	University(c)	63(32.2)	4.55±3.35		3.05±.33	
Spouse	Yes	174(87.8)	4.59±3.38	.67	3.02±.36	-1.06
	No	22(12.2)	4.07±3.11	(.49)	3.11±.32	(.28)
Job	Have	113(57.7)	4.41±3.23	-.67	3.02±.37	-.70
	Not have	83(42.3)	4.73±3.51	(.50)	3.05±.34	(.48)
Economic status	Satisfaction	101(51.5)	3.73±3.15	-3.62	3.09±.32	2.17
	Dissatisfaction	95(48.5)	5.42±3.35	(.000)	2.97±.39	(.03)
family life	Satisfaction	163(83.1)	4.12±3.10	-4.08	3.07±.34	2.99
	Dissatisfaction	33(16.9)	6.64±3.81	(.000)	2.86±.40	(.01)

Table 2: Mean Scores and Range for Health behavior, Family Function, and Depression

(N=196)

Variables	M (SD)	Min	Max	Possible range
Depression	4.55 (3.35)	0	14.10	0 - 15
Health behavior	3.03 (0.36)	1.64	4.0	1 - 4

Table 3: Correlation between Depression, and Health behavior

(N=196)

Variables	r (p)	
	a	b
Depression(a)	-	-4.04(.000)
Health behavior(b)	-4.04(.000)	

#### IV. CONCLUSION

The mean score for the depression of the subjects was 4.55 out of 15 points. It was slightly lower than 44.11 out of 100 points in a previous study about middle-aged women, although different measurement tools were used in two studies. These different results may be explained by the lower ages of the subjects of this study compared with the participants of Kim, S. J., & Kim, S. Y.; the subjects of this study were aged 30 to 50 and thus relatively young.

The mean score for health behaviors was 3.03 points. It was a slightly higher score when compared with the result of a previous study about elderly people, which reported 2.9 points as the score for health behavior. The different results may be due to the difference in the subjects in that one study was conducted with middle-aged people and another dealt with the elderly, and this fact indicates the need for conducting a comparison study of them in the future.

For the levels of depression and health behaviors depending on the general characteristics of the subjects, it was found that as the satisfaction with the economic status was increased, the score for depression was decreased, yet the score for health behaviors was increased. These results are similar to those of a previous study about middle-aged women, which showed that the higher the monthly income was, the less likely depression was to occur and that if exercise was done regularly, the incidence of depression was decreased.

For the correlation between depression and health behavior, it was found that the lower the depression score was, the better health behaviors were performed.

In order to facilitate successful aging of middle-aged women and improve the quality of life of them, it is necessary to develop and apply programs for decreasing their depression and increasing their health promoting behaviors. Since South Korea has reached the stage of the post-aged society, the interest in the health care of the elderly is increasing, and in this respect, extensive research for the happy life of middle-aged women is required.

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## Comparison on the Prehabilitation between Korea and the United States

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### Abstract---

**Background/Objectives:** In the USA, the various studies have proven the effects of prehabilitation information. But Korea has few studies on prehabilitation because of low awareness. The purpose of this study is to compare and analyze the paper by investigation in the United States and Korea.

**Methods/Statistical analysis:** To compare the state in the USA and South Korea by using 'prehabilitation' or similar words, references were searched in Pubmed and RISS. After initial searching with 'prehabilitation' including the title and content to investigate the effect of prehabilitation, secondary search conducted using with Surgery, 'Orthopedic', 'Cancer', 'Cardiopulmonary', 'Artery', 'Pulmonary', 'Urogenital', 'Prostate', 'Motor'. In order to obtain information on the latest research, data was limited to the last 10 years published articles since 2005 and conducted third searching additional effect, impact, influence, outcome for investigate more about the effect of prehabilitation which results presented above.

**Findings:** We revealed that four systems (musculoskeletal, cardiopulmonary, urogenital, the others) are associated with the efficacy of preoperative exercise programs. The United States have studies about prehabilitation much more than Korea. In foreign countries, there are many studies have demonstrated the effect of the prehabilitation. Therefore, on the basis of this study, Korea need more researches about prehabilitation and requires the introduction to bring the bright future of Korea. New concept known as prehabilitation is physical therapy before surgery. It is good for rapid recovery after surgeries, preventing complications, reduction of hospitalization period by 'performing physical therapy such as respiratory exercise, aerobic exercise, muscle strengthening, physical electrical treatment and etc to patients'. Through prehabilitation, recuperative powers are improved after surgery and patients enjoy high quality of life.

**Improvements/Applications:** This systematic review has shown that the effects of the prehabilitation proved at studies and that it relates to the background necessity of prehabilitation to which they are being performed. Systematic review provides strong evidence of preoperative exercise

**Keywords---** Prehabilitation, Preoperative Exercise, Pretreatment Intervention, Physical Therapy, Quality of Life.

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## I. INTRODUCTION

Increasingly we are an aging society, morbidity and mortality are increasing gradually in global, many people are concerned about cancer and disorder. Because we need health and high quality of life so in these days, we tend to prefer prevention or exercise<sup>1</sup>. Although prehabilitation is not a new concept and its use is not specific to individuals diagnosed with problems, evidence-based prehabilitation interventions appropriate for use within this specific population are emerging<sup>2</sup>. There is emerging empirical evidence that prehabilitation may positively influence postoperative outcomes, such as functional ability<sup>3</sup>. Using prehabilitation as a search term did not identify most of the articles used in this review because many pretreatment interventions were not identified in the specialized text as prehabilitation<sup>4</sup>.

Prehabilitation has been defined as "the process of enhancing functional capacity of the individual to enable them to withstand the stressor of inactivity"<sup>5</sup>. Preparatory evidence suggests that prehabilitation a process designed to enhance functional capacity before exposure to surgical stressors, improves wound healing, reduces postoperative complications, and cuts down hospital length of stay<sup>6-8</sup>. Prehabilitation is the beginning of the rehabilitation care continuum during which there may be an opportunity to obtain a baseline status, identify pretreatment impairments, improve physical and emotional health before treatment, reduce treatment-related morbidity and mortality, decrease length of hospital stay and readmissions, increase available treatment options for patients who would not otherwise be candidates, and quickly facilitate return of patients to the highest level of functional possible<sup>4</sup>. The preoperative period may in fact be a more salient time to intervene, as patients are generally in a better physical condition compared with the acute postoperative period, and may have a prolonged waiting period before surgery (in many healthcare systems)<sup>9</sup>. The process of enhancing an individual's functional capacity before scheduled surgery, aimed at improving the patient's tolerance to upcoming physiologic stress, has been coined prehabilitation<sup>6</sup>. American physical therapy association (APTA) examined that the preoperative period in fact may be a more salient time to intervene, as patients are generally in a better physical condition<sup>10,11</sup>.

Diverse healthy patient populations and demonstrated improved patient outcomes by a variety of methods have used prehabilitation using simple or complicated approaches<sup>4</sup>. Most researches studies which have been related to the current rehabilitation are focusing on rehabilitation after surgery. The state of preoperative rehabilitation for the impact of the knee recovery is insufficient. As a condition for the surgery in clinical and underwent surgery rehabilitation has been used to be limit only until calming the inflammation and swelling<sup>12</sup>.

Through present studies, we need awareness of prehabilitation to health professionals in Korea and want to know which now going program or not such as prehabilitation before surgery. Moreover, if they are not doing, we examine whether there is to be executed. Prehabilitation and related programs should be introduced to Korea widely as soon as possible, so that they can be helpful in improving the health and quality of life of the community members. Thus, the aim of this study, we investigate fields that requires prehabilitation, and examine whether there is any area to be extended. Additionally, we expect to see expansion and specialization in the role of the physical therapist in the prehabilitation.

Physical therapists of Korean physical therapy association (KPTA) suggested that physical therapist involved in legal business such as hyperthermia, electro therapy, phototherapy, hydrotherapy, the use of machines and mechanisms therapy, massage, functional training and physical corrective exercises and rehabilitation and management of the necessary equipment and medications, physics and other required therapy. In accordance with an increase in the elderly population with chronic degenerative diseases and geriatric patients with nervous system, the management of musculoskeletal disorders and medical needs of the precautionary approach, including physical therapy sector continues to increase. In general, physical therapy orthopedics, rehabilitation medicine, neurosurgery, anesthesiology, general surgery area on the limited thought that if many things, in fact, stroke, spinal cord injury, cerebral palsy, musculoskeletal system disease in addition pediatrics, obstetrics and gynecology, Thoracic and cardiovascular surgery, dentistry, etc., and physical therapy are comprehensively applied in all the required fields<sup>13</sup>.

APTA defined that physical therapy is a dynamic profession with an established theoretical and scientific base and expansive clinical applications in the restoration, maintenance, and promotion of optimal physical function. Physical therapists are health care professionals who help individuals maintain, restore, and improve movement, activity, and functioning, thereby enabling optimal performance and enhancing health, well-being, and quality of life. Their services prevent, minimize, or eliminate impairments of body functions

and structures, activity limitations, and participation restrictions. Physical therapist provides for individuals of all ages who have or may develop impairments, activity limitations, and participation restrictions related to (1) conditions of the musculoskeletal, neuromuscular, cardiovascular, pulmonary, and/or integumentary systems or (2) the negative effects attributable to unique personal and environmental factors as they relate to human performance<sup>14,15</sup>.

Physical therapists play vital roles in today's health care environment and are recognized as essential providers of rehabilitation and prehabilitation, performance enhancement, and prevention and risk-reduction services. Physical therapists also play important roles both in developing standards for physical therapist practice and in developing health care policy to ensure availability, accessibility, and optimal provision of physical therapy<sup>16</sup>. In addition, supplement contents of a description about the further prevention, activities that are directed toward achieving and restoring optimal functioning, minimizing impairments, limitations, and participation restrictions, maintaining health (thereby preventing further deterioration or future illness), creating appropriate environmental adaptations to enhance independent function<sup>14</sup>.

In World health organization(WHO), The prevention has a total of three steps, Primary prevention is actions to avoid or remove the cause of a health problem in an individual or a population before it arises. Secondary prevention is actions to detect a health problem at an early stage in an individual or a population, facilitating cure, or reducing or preventing spread, or reducing or preventing its long-term effects. Third prevention is actions to reduce the impact of an already established disease by restoring function and reducing disease-related complications<sup>17</sup>.

In World confederation physical therapy (WCPT) what is rehabilitation of the physical therapist is a set of measures that assist individuals who experience, or are likely to experience, disability to achieve and maintain optimal functioning in interaction with their environments<sup>11</sup>. A distinction is sometimes made between prehabilitation, which aims to help those who acquire disabilities congenitally or early in life to develop maximal functioning; and rehabilitation, where those who have experienced a loss in function are assisted to regain maximal functioning<sup>18</sup>." The difference between prehabilitation and rehabilitation is as follow. Carli et al. (2005) indicated that The process of enhancing an individual's functional capacity before scheduled surgery, aimed at improving the patient's tolerance to upcoming physiologic stress, has been coined prehabilitation<sup>6</sup>. David et al. said that prehabilitation is the reduced need for inpatient rehabilitation postoperatively will also aid in lightening the financial and logistical burden on the hospital system<sup>19</sup>. According to Santa Mina et al., we found that recent effects of prehabilitation are "prehabilitation is a term used to rehabilitation preoperatively in elective cases with the aim of reducing perioperative complications, shortening length of stay, and improving functional status<sup>20</sup>." In up-to-the-minute study, David asserted that "Although some individual studies show promise<sup>21</sup>. The utility of prehabilitation requires more robust research before it becomes standard best practice, although its maximal benefits are yet to be determined, it certainly offers very little detriments to health."

## **II. LITERATURE REVIEW**

### **A. Data Collect**

#### **Data Search Path**

By using the 'prehabilitation' and similar words such as 'preoperative rehabilitation', 'preoperative exercise', 'preoperative exercise therapy', 'preoperative prevention', 'preoperative training', 'prophylactic exercise' and 'prephylactic rehabilitation', the prehabilitation State in South Korea and the United States have been searched through Pubmed for investigation.

In addition, for clarity of the meaning of prehabilitation and Prevention, Rehabilitation each word definition of prevention and rehabilitation were examined in World Health Organization (WHO)<sup>23</sup>, World confederation for physical therapy (WCPT), American physical therapy (APTA), Korean physical therapy (KPTA). In this case with prehabilitation, the publication of various authors was quoted because there was no clear definition at the above institutions cited.

Therefore, this study compared to base on the number of the words results after searching similar words such as 'preoperative rehabilitation', 'preoperative exercise', 'preoperative exercise therapy', 'preoperative prevention', 'preoperative training', 'prophylactic exercise' and 'prephylactic rehabilitation', to investigate the

prehabilitation state of Korea through RISS of Korea education and research information service (KERIS) that in the same way as the search in Pubmed.

### ***Selection and Exclusion Criteria of the Data***

In this study, after initial searching with 'prehabilitation' including the title and content to investigate the effect of prehabilitation, secondary search conducted using with surgery, 'Orthopedic', 'Cancer', 'Cardiopulmonary', 'Artery', 'Pulmonary', 'Urogenital', 'Prostate', 'Motor'. In order to obtain information on the latest research, data was limited to the last 10 years published articles since 2005 and conducted third searching additional effect, impact, influence, outcome for investigate more about the effect of prehabilitation which results presented above. After reading intensively, does not contain exercise and does not correspond with the purpose (for example review article, study on the evaluation, non-English, etc.), any medication alone or psychotherapy were excluded in this study. This study did not limit study design, number of subjects, age and the way in selecting reference.

### ***Classification***

This study is classified four parts of the systems as 'musculoskeletal', 'cardiopulmonary', 'urogenital' and 'the other system' in order to investigate effect of prehabilitation according to area. In each study, 'Author (Year)', 'Study design', 'Subject number', 'Area', 'Old', 'Effect', 'Intervention' were summarized to table by through consideration of the reference.

## ***B. Survey Research***

### ***Participants***

Participants in this cross-sectional survey were recruited from specialist who currently have citizenship of the Republic of Korea and acquired a medical license. 118 health related specialists who are treating patients in clinical hospital in S city and D city were invited to participate. Respondents who contacted in advance and wish to participate the questionnaire were conducted voluntary. Characteristic information of participations is presented in Figure 1, including, gender, age, occupation, place of employment<sup>22</sup>.

### ***Questionnaire Structure***

After filling in preliminary questionnaire, the questionnaire was reviewed to obtain validity and reliability by six medical related workers who have worked more than five years and that was revised based with their feedback. By using Dichotomous question were gained information of their gender and place of employment on the personal and checked whether or not have experience<sup>23</sup>. Moreover, three point and five point question Likert scale were used to obtain age, job(each one question), prehabilitation awareness (ten questions), current state (seven questions) and necessity of prehabilitation (seven questions)<sup>24</sup>. Because of advantages time-efficient, easy to understand and ideal for quantitative type of research, closed-end questions were used to limit the question options answers for respondents. Moreover, contingency questions<sup>25</sup>. To gain more precise answers about the respondent of a particular question, contingency questions (short-answer question) are used. In order to notify that necessity of prehabilitation inquired about benefits of future marketability to become a preoperative program invigoration at the end of survey. Open-ended questions included the following "What do you want prehabilitation program?"<sup>26</sup>.

### ***Procedure***

Questionnaires were delivered to the participants by mail or personal delivery, fourth items among the question was conducted after listening to direct description of the researchers of prehabilitation. Through Self-administered approach, paper-and-pencil survey for respondents was used in order to a traditional survey administration method. After participants were recruited in April, we investigated materials, designed and filled out questionnaire in May-June. The instructions, spacing, layout and printed look of the survey was reviewed by double checking before administering them.

### ***Statistical Analysis***

Microsoft Excel (version 2013) and Statistical package for the social sciences (SPSS software, version 22) software were used for frequency analyses. Enter the number of respondents for each question on the Excel worksheet, using "data analysis - descriptive statistics" and using the histogram was calculated frequency analysis data<sup>27</sup>. To obtain a more precise value, frequency analysis was calculated through entering variables of the data and using SPSS histogram<sup>28</sup>.

### III. PROPOSED WORK

#### A. *State of Papers Published in Accordance with the Effect of Prehabilitation*

First, 105 pieces of paper were searched when searching prehabilitation through Pubmed, Second, in order to obtain the latest informations we limited the articles which are published in the last 10. The result was 67 piece of paper when accompanied by a search query: 'Surgery', 'Orthopedic', 'Cancer', 'Cardiopulmonary', 'Artery', 'Pulmonary', 'Urogenital', 'Prostate', 'Motor'. To learn more effects of Prehabilitation, we put additional 'Effect', 'Impact', 'Influence', 'Outcome' in order to conduct the third searching. When perusing these papers, the sole medication, psychotherapy, contents which does not contain the exercise intervention, studies that purpose is not correct (review article, study on the evaluation, non-English, etc.) are excluded, total number of service study was 24 papers.

When classified by the paper system, musculoskeletal system has 8<sup>29-36</sup>, cardiopulmonary system has 3<sup>37-39</sup>, urogenital system has 5<sup>40-44</sup>, cancer and other general surgery were shifted when tied nervous System, including in the others 8<sup>9,16,25,45-49</sup>.

Studies which classified as a case study design have 4, case-control group which conducted pre-posttest design has 7, a repeated-measures design has 1, Stratified block-randomized trial has 1, randomized controlled trials have 10 pieces. Thus, the randomized cases are the most common controlled trial.

Musculoskeletal system of the area of the Total knee (hip) arthroplasty has 6, Lumbar fusion surgery has 1, isolated anterior cruciate ligament (ACL) tear in the knee has 1, Total knee(or hip) arthroplasty is the most common, cardiopulmonary system that the area is Coronary artery bypass grafts surgery has 2, lung cancer has 1. In the urogenital system, robotic-assisted total abdominal hysterectomy has 1, radical prostatectomy has 3. There are elective radical cystectomy and ileal conduit pieces of paper has 1. In the other Surgery of the posterior cranial fossa has 1, rectal cancer has 3, General surgery has 4.

Interventions of the musculoskeletal system Resistance training, flexibility, step training are most common, cardiopulmonary system are accounted the majority of inspiratory muscle strengthening. The pelvic floor muscle training in urogenital system was conducted most common, the most of other aerobic exercise and resistance exercise.

When analyzing the effects of all the papers, it is proved that increase physical function, decrease pain, decrease complications, length of hospital stay seen the effect of such reduction.

#### B. *Survey Results*

##### *Prehabilitation Awareness Questions*

"Do you know the word about rehabilitation?" it responded that there was more than half to 53%, 'a lot'. Respondents who look up any information about the rehabilitation and related materials responded 49%, 'a lot'. The respondents who learned a lot of information from the specialized books have 47%, lecture have 41%, mainly school major teaching could see that. Respondents to this question "Have you ever treated with rehabilitation?" have 53%, people who experienced physical therapy in the hospital were the most common. Most respondents to this question "Do you know the word about prehabilitation (or Preoperative physical therapy, intervention)?" have 31% to "a little".

Most respondents who know prehabilitation and experience the prehabilitation have "a little" to 44%. Moreover, the path which found mainly specialized books was the most "Do you know the word about rehabilitation?" it responded that there was more than half to 53%, 'a lot'.

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### ***Current State Questions***

The results reported that the nervous system has the main customer 77% of organizations who are currently working, musculoskeletal has 22%, and the other has 1%.

Respondents who currently implement training after the surgery to patients in institutions have "Yes" to 40%, and "Have no idea" to 36%.

Place where patients have to say that the OS contracture prevention education programs, ROM recovery exercise, ADL training, parental education, falling prevention, lymphedema prevention education, education postoperative posture, gait training was that the response to the open-ended answers. In addition, 60% of respondents showed little effect to patient after rehabilitation. Importantly respondents who did not appear in the selected effects in this question. Respondents who have the preoperative education or programs that they implement to patients in their institutions answered "have no idea" to 54%. While people who answered "Do you have prehabilitation program?" have the lowest at 9%. The institutions which respond to "yes" have 'supervise and home programs for sports injury prevention', 'posture training', 'preventive education', 'muscle strengthening exercises'. When processing of these programs, prehabilitation proved that there was each 47% increase in the response to each of the "average" and "not much effect".

### ***Prehabilitation Necessity Questions***

People respond to this questionnaire after researchers demonstrate brief description about prehabilitation.

Researcher explained new concept known as prehabilitation is physical therapy before surgery. It is good for rapid recovery after surgeries, preventing complications, reduction of hospitalization period by 'performing physical therapy such as respiratory exercise, aerobic exercise, muscle strengthening, physical electrical treatment and etc., to patients'. Prehabilitation has enhanced recuperative power of patients after surgery and help them to improve high quality of their lives. 46% of participants answered "Perfectly understood".

There are 74% of respondents who think the relationships between physical therapy and prehabilitation have a lot. In addition, 65% of respondents answered "a lot" at the necessity questions of prehabilitation. And 85% of their essentially consider to need prehabilitation because prehabilitation is effective in patients' treatment.

Finally, 74% of the respondents said "yes" in question of "Are you willing to perform prehabilitation if it is officially introduced?".

Many healthy related specialists said that prehabilitation will be implement to enforce interested in prehabilitation. Open-closed answers to the last question of "If it is introduced, how are you going to make a program with it?" have 'medical training therapy concept applies to treatment', 'the introduction of preoperative psychological as physical stability program focused on biological rhythms, applies to programs for the contraction or atrophy prevention', 'surgical and functional training of surgical surrounding muscles and strengthening implementation', 'range of motion and fitness maintenance program', 'skilled training for posture training and home program in progress', 'basal physical fitness strengthened by whole body exercise through underwater treatment, surgical areas intensive exercise performed', 'respiratory and promoting cycling training', 'edema prevention and flexibility improvement', 'activities of daily living training', etc. as means to prehabilitation.

### ***C. Previous Result***

To compare the state in the United states and South Korea by using 'prehabilitation' or similar words, references were searched in Pubmed (the United States journal site) and RISS (the South Korea journal site).

When we searched 'prehabilitation' in Pubmed, there are 105 pieces of paper (Figure 1).

We used the Pubmed at part of the Entrez information retrieval system in the US national library of medicine (NLM) of the National institutes of health.

It is maintained a database, administration, life sciences, and free search engine containing the reference and summary for biomedical topics.

When we searched by using the same word above, only two documents were retrieved at Korea academic research information sharing service (Figure 2, 3).

In addition, in the result of search for similar words 'prehabilitation' showed a significant difference in the number of words. Research information sharing service(RISS) is an academic research information system provided by the Korea education and research information service in the South Korea ministry of education that institutions established in 1998.

Search Term	No. Articles Identified in PubMed <sup>a</sup>
Prehabilitation	105
preoperative rehabilitation	5457
preoperative exercise	744
preoperative exercise therapy	2508
preoperative prevention	18986
preoperative training	7036
prophylactic exercise	702
prephylactic rehabilitation	750

<sup>a</sup> Searches were conducted in September 2015.

Figure 1: Prehabilitation Literature Search Results

Search Term	No. Articles Identified in RISS <sup>b</sup>
Prehabilitation	2
preoperative rehabilitation	5463
preoperative exercise	32
preoperative exercise therapy	5
preoperative prevention	76
preoperative training	9
prophylactic exercise	10
prephylactic rehabilitation	0

<sup>b</sup> Searches were conducted in September 2015.

Figure 2: Prehabilitation Literature Search Results

System	Author (Year)	Study design	Subject number	Area	Age	Intervention	Effect
Musculoskeletal	Rooks et al (2006) <sup>1</sup>	Case-control group pre-post test design	108	Total hip and knee arthroplasty	65.2-11	Total body fitness program of cardiovascular, strength, and flexibility training 2 times for 6 weeks before surgery	Stabilize, improvement in muscle strength and function and reduce period of hospitalization
	Aggers et al (2007) <sup>2</sup>	Case study	2	Total knee arthroplasty	62	Resistance training, flexibility, and step training, 3 sessions per week for 5 weeks before surgery	Increase physical function
	Nordström et al (2008) <sup>3</sup>	Randomized controlled trial	60	Lumbar fusion surgery (degenerative lumbar disease)	48 (31-72)	The pain treatment was operated by the home training for 6 weeks with 2 preoperative rehabilitation	Reduce direct hospital costs, "visibility" duration and percent complications
	Topp et al (2008) <sup>4</sup>	Apprentices design	54	Total Knee Arthroplasty	64.12-108	4 weeks before surgery: resistance training, flexibility, and step training, 3 times per week for 4 weeks before surgery	Increase in all measures of knee pain, performing functional tasks
	Bonetti et al (2010) <sup>5</sup>	Case study	1	Total Knee Arthroplasty	69	Resistance training, flexibility and step training 3 per wk for 4 weeks	Increase knee extension and flexion strength, improvement in postoperative pain
	Swank et al (2011) <sup>6</sup>	Case-control group pre-post test design	71	Total Knee Arthroplasty	66.7-65.5	Resistance training using bands, flexibility, and step training at least 3 times per wk for 4-6 weeks before surgery	Increase leg strength and the ability to perform functional tasks
	Bowers et al (2012) <sup>7</sup>	Case-control group pre-post test design	32	Total knee arthroplasty	≥65	Exercise three times per week, once at home and twice at the physical therapy lab, for 8 weeks (warm up, resistance exercises, flexibility exercises, step training, and 4 cool-downs)	Lighter in the role emotional and mental health measures
	Shawara et al (2013) <sup>8</sup>	Randomized controlled clinical trial	42	Isolated anterior cruciate ligament (ACL) tear in the knee	18-45	6 wk gym and home-based progressive exercise program, lower limb strengthening with particular attention to the quadriceps, proprioception training	Increase the quadriceps strength and function of the knee, improvement in quadriceps strength and neuromuscular feedback, increase dynamic stability during gait
	Hirshfeld et al (2006) <sup>9</sup>	Randomization controlled group pre-post design	279	Coronary artery bypass grafts surgery	<70	Breathing training, respiratory muscle training, endurance training 4 very day for 2 weeks before surgery	Length of hospital stay reduction and save the effects of increased admission power
	Fellman et al (2011) <sup>10</sup>	Randomization controlled group pre-post design	60	Lung cancer	54.0-74.53	Intensive physical therapy (aerobic, psychosocial and walking exercise 1 wk before the planned surgery)	Increase oxygen saturation and reduced hospitalization period
Cardio pulmonary	Sawada et al (2010) <sup>11</sup>	Randomization controlled study	15	Coronary artery bypass grafts or valvular surgery	63.4-9	Block training respiratory muscle that used exercise (6 min over 4 times a week) for 4 weeks	Reduce hospitalization period and decreased risk of pulmonary complication after surgery
	Carli et al (2011) <sup>12</sup>	Case study	1	Robotic-assisted total abdominal hysterectomy	88	3 times per wk for 4 weeks, strengthening of the upper and lower core muscles, abdominal breathing exercises, and improving cardiovascular function	Increase respiratory function, cardiovascular and respiratory function
	Genetsis et al (2013) <sup>13</sup>	Randomization controlled group pre-post design	180	Open radical prostatectomy and robotic assisted laparoscopic radical prostatectomy	<65	Performed pelvic floor muscle training (PFMT) for 4 weeks before the surgery	PFMT had no better duration of postoperative urinary incontinence compared with patients with only postoperative PFMT
	Prid et al (2013) <sup>14</sup>	Randomization controlled group pre-post design	284	Radical oropharyngeal, prostatectomy	62 (44-76)	Pelvic floor muscle training 4 weeks before operation	Increase the duration of urinary incontinence
	Carli et al (2014) <sup>15</sup>	Case study	1	Diagnosed with bladder cancer scheduled for an elective radical cystectomy and distal urectomy	85	27 day progressively and included aerobic and resistance exercise perform the group exercise program for 1 wk for a minimum of 3 times per wk	Increase patient's functional walking capacity, emotional and cognitive function as previously, improvement in cardiorespiratory function
	Saha-Mishra et al (2014) <sup>16</sup>	Randomized controlled trial	100	Radical prostatectomy	46-80	Total-body exercise (5-10 min warm-up, 25 min of aerobic exercise, 25 min of resistance training, and 3-5 min cool-down) and pelvic floor muscle training at 2-4 days per wk for 4-8 weeks before surgery	Increase physical activity level, male sexual function and quality of life
	Dworkers et al (2008) <sup>17</sup>	Randomized controlled trial	20	Abdominal aortic aneurysm surgery	<65	Increase the strength and endurance of the respiratory muscles for 2 weeks	Increase the incidence of infections
	Kim et al (2009) <sup>18</sup>	Case-control group pre-post test design	21	Bowel resection surgery	55±15	Aerobic exercise 4-6 weeks before surgery	Increase functional exercise capacity
	Carli et al (2010) <sup>19</sup>	Stratified block-randomized trial	133	Colorectal surgery (non-invasive inflammatory bowel disease)	60	Electrolyte for resection of benign colonic polyps and colonoscopies	Increase after functional walking capacity over this period and maintain the benefit of this simple prehabilitation programme after surgery
	Magnusson et al (2011) <sup>20</sup>	Case-control group pre-post test design	12	Surgery of the posterior cranial fossa (Meniere's disease)	50 (22-70)	30-min physical therapy sessions per wk, stretching exercises, trunk rotation (dislocation of the pelvis and shoulder girdle), deep breathing, respiratory muscle training, active upper and lower extremity exercises, walking, and calculation, 2 to 3 weeks before surgery	Reduction in vestibular dysfunction with earlier return to work
The others	Saoua et al (2013) <sup>21</sup>	Case-control group pre-post test design	16	Upper abdominal surgery	≥40	per wk, Stretching exercises, trunk rotation (dislocation of the pelvis and shoulder girdle), deep breathing, respiratory muscle training, active upper and lower extremity exercises, walking, and calculation, 2 to 3 weeks before surgery	Increase pulmonary function and physical performance
	Li et al (2013) <sup>22</sup>	Case-control group pre-post test design	87	Colorectal cancer surgery	67.4-11	Moderate aerobic exercise and resistance exercise 3 times/wk	Increase functional recovery
	Gillis et al (2014) <sup>23</sup>	Randomization controlled group pre-post design	77	Colorectal resection for cancer	65.7-114	Resistance exercises, nutritional counseling with protein supplement intake, and resistance exercises initiated either 4 weeks	Increase functional exercise capacity
	West et al (2015) <sup>24</sup>	A 6-week interventional pilot study	39	Preoperative rectal cancer	≥18	Block training 3 sessions per wk for 6 weeks	Increase equally in the first 3 days of the fitness intervention

Figure 3: Current Publication about Prehabilitation

## IV. CONCLUSION

This systematic review has shown that the effects of the prehabilitation proved at studies and that it relates to the background necessity of prehabilitation to which they are being performed. Systematic review provides strong evidence of preoperative exercise. Furthermore, it revealed that four systems (musculoskeletal, cardiopulmonary, urogenital, the others) are associated with the efficacy of preoperative exercise programs. Those programs can make people obtain a high quality of their lives. We found various studies that had investigated the effectiveness of prehabilitation. According to databases, the prehabilitation references have shown many important qualities, efficiencies which related benefits as well as development possibility to generalizability and empirical data on effects<sup>50</sup>.

### A. Effectiveness of the System of Prehabilitation

#### **Musculoskeletal System**

Musculoskeletal diseases are public health concerns and have an enormous burden on society due to their chronic characteristics and the associated severe pain<sup>17</sup>. In addition, they also affect the psychological health of patient families and guardians<sup>51</sup>. When classified by the system prehabilitation, musculoskeletal system appeared on the most results.

In 2008, Nielsen et al. conducted a randomized controlled trial with 60 patients who underwent lumbar fusion surgery because of degenerative lumbar disease in order to examine the cost and the effect on the quality of life due to prehabilitation and early rehabilitation after surgery on the lumbar spine<sup>32,52</sup>. Integrated programme 28 people, 32 people participated in standard program, the pain treatment was optimized for the home training during 6wks with preoperative prehabilitation. While in the early postoperative physical therapy of hospital patients increase to double the amount of time, drink protein-rich beverage, make effort it a well-balanced life. The direct hospital costs as well as indirect costs were effective to reduce "disability" duration and prevent complications. Total hip and knee arthroplasty is one of the most common musculoskeletal surgery<sup>29,30,35,36</sup>. When applying preoperative exercise to patients, there is a study which reviewed regarding of functional condition, pain, and the effects of muscle after the surgery. Rooks et al. have 6weeks exercise at exercise group and have educated to control group for total of 108 men and women in the [Figure 2] <sup>33</sup>. Before at Total hip arthroplasty(TKA) & Total knee arthroplasty(THA) surgery. TKA, THA patients with a preoperative exercise for 6 weeks appeared to stabilize due to the improved level of improvement in muscle strength and function and showed significant difference between the two groups. In addition, 65% respondents of the exercise group were discharged home and 35% were going to rehabilitation facilities, 44% of the training group were discharged home and 56% went to a hospital that specializes in rehabilitation facilities. Pre-operative exercise has dramatically reduced the rehabilitation period after hospitalization<sup>33</sup>. TKA patients in five papers performed "resistance training, flexibility, and step training movement" used by Topp in 1994<sup>53</sup>. Applying the frequency and duration are both differed "Increase physical function, decrease in all measures of knee pain and Higher in the role emotional and mental, health measures" showed such good effect<sup>36</sup>.

Finally, in 2013 Shaarani et al. the anterior cruciate ligament surgery scheduled patients to (6wks gym and home-based preoperative exercise program, lower limb strengthening with particular attention to the quadriceps, proprioception training) and apply to have time, there are effect of "Increase the quadriceps strength and function of the knee improvement symmetrical quadriceps strength and neuromuscular feedback, increase dynamic stability during gait"<sup>34</sup>. When applied prehabilitation to the musculoskeletal system patient in any of the above paper it was found that good results are shown<sup>54</sup>.

#### **Cardiopulmonary System**

Cardiovascular disease is a major cause of death it accounts for over four million deaths annually in Europe and over half a million deaths per year in the United States<sup>55</sup>. Therefore, Prevention of secondary disease and complications for patients with cardiovascular disease is very important<sup>56</sup>.

In 2014, Sawatzky et al. mentioned that results of muscle training (inspiratory muscle) that tried exercise 60minutes one day, twice a week, for four weeks for people undergoing coronary artery bypass grafts or valvular surgery have reduced hospitalization period and decreased risk or pulmonary complication after surgery<sup>39</sup>.

Similarly, Hulzebos et al. scheduled coronary artery bypass graft (CABG) 140 patients among 279 people are as the target<sup>37</sup>. At least two weeks before surgery, they performed the prehab everyday (breathing training, inspiratory muscle training, endurance training etc.), we found that length of hospital stay reduction and saw the effects of increased inhalation power. Preoperative physical therapy which is accompanied with inspiratory muscle training shows reduction of the risk of Postoperative pulmonary complications after CABG surgery, increasing the inhalation force, and the effect of decreasing of hospitalization<sup>37</sup>.

In 2011, When Pehlivan et al. performed preoperative short-term physical therapy before lung cancer surgery, they showed that results affect significantly on the exercise capacity of patient such as increased oxygen saturation and reduced hospitalization period<sup>38</sup>.

When applying prehabilitation before lung surgery to patients scheduled for lung surgery, this study investigated effects of aerobic capacity, quality of life, postoperative complications, and length of hospital stay. Patients in this study said that from got beneficial effects on aerobic capacity and fitness, quality of life and reducing complications and hospital stay<sup>57</sup>.

### ***Urogenital System***

Prehabilitation has been variously conducted in urogenital surgery. Additionally, hysterectomy is a common gynecological procedure with approximately 600,000 cases performed annually in the United States. More than 70% of hysterectomies are performed for benign surgical indications, including menorrhagia, fibroids, pelvic pain and uterine prolapse. Accordingly, prehabilitation is required to reduce the pain in the lower abdominal area to aid in recovery<sup>58</sup>.

In 2012 Carli et al. a 88-year-old woman who performed preoperative hysterectomy is performed exercises 3 times per wk for an hr, strengthening of the upper and lower extremities, abdominal breathing exercises<sup>41</sup>. From this protocol, improving cardiovascular function, increase cognitive function, cardiovascular and respiratory function effects appeared. More than 12 million new cases of cancer occur annually in a global world. Cancer occurrence in developing countries is predominated by tumor types that are related to viral and bacterial infections such as liver, stomach and cervical cancer. Urinary bladder cancer ranks ninth in worldwide cancer incidence. Therefore, prevention of bladder disease is considered very important<sup>59</sup>. When performed aerobic and resistance exercise and resistance exercise and perform the given exercise for 27 days to 85-year-old female patient before surgery bladder cancer by above author in 2014, Increase patient's functional walking capacity, emotional and cognitive function as previously, improvement in cardiorespiratory function effects taken<sup>40</sup>.

Prostate cancer is recognized as one of the big medical problems facing the male population. In foreign country, an estimated 2.6 million new cases of cancer are diagnosed each year. Accordingly, it is committed to focusing on decreasing the incidence of these diseases.

However, the results were not positive effects at all. In two papers when performed prehabilitation when he underwent pelvic floor muscle exercise, increase physical activity level, male sexual function and quality of life, decrease the duration of urinary incontinence effects showed, but, the paper was to learn about the effects of prehabilitation on urinary incontinence what appeared complications after prostate surgery. In 2013, the study experimented the effect of preoperative pelvic floor muscle training (PFMT) for 180 patients scheduled open radical prostatectomy and robot-assisted laparoscopic radical prostatectomy. Experimental group (n=91) performed PFMT for 3 weeks before the surgery, control group (N=89) started PFMT after removal of the catheter PFMT. The primary end point was time to continence. Secondary end points were 1-h pad test, visual analog scale, International Prostate Symptom Score and quality of life. Patients who underwent preoperative PFMT have not a short period of incontinence surgery compared with patients who have postoperative PFMT. 10 Influence of preoperative and postoperative PFMT compared with postoperative PFMT on urinary incontinence after radical prostatectomy: a randomized controlled trial<sup>44</sup>.

### ***The Others System***

There is no doubt that cancer places an enormous financial burden on individuals and societies throughout the world. We examined the effects on prehabilitation for cancer or other diseases<sup>60</sup>. In addition, it was found on prehabilitation general surgery, cancer and effects in the nervous system. In addition, before general surgery was variously enforced prehabilitation<sup>61</sup>.

Before surgery, patients who is scheduled abdominal aortic aneurysm surgery for two weeks performed increasing the strength and endurance of the inspiratory muscles enforcement as a result decrease the incidence of atelectasis effects seen, and when performed for 4 weeks with aerobic exercise before the surgery to 21 patients Bowel resection surgery appeared an increase functional exercise capacity effect<sup>45</sup>.

Soares et al. in 2013, 16 patients who is scheduled upper abdominal surgery performed from 2-3weeks before surgery 50-min per week in physical therapy sessions, stretching exercise, trunk rotation (dissociation of the pelvis and shoulder girdle), deep breathing, respiratory muscle training, active upper and lower extremity exercise, walking, and relaxation, enforcement, finally, increasing pulmonary function and physical performance effects showed<sup>49</sup>.

Carli et al. in 2010, people of average age 60 patients who is colorectal surgery due to non-active inflammatory bowel disease were conducted. Using the stratified block-randomized trial by a total of 133 people involved experiment (Electively for resection of benign or malignant colorectal lesions) and with bike/strengthening group performed (weight training three times a week, do push-ups, sit-ups, lunges)<sup>16</sup>. Walk/breathing group practiced deep breathing at full vital capacity and diaphragmatic breathing, huffing and coughing for 5 min per day. In this case, increasing their functional walking capacity over this period and maintaining the benefit of this simple effects of prehabilitation program after surgery were showed<sup>16</sup>.

Another experiment with colorectal cancer in 2013, Li et al. conducted by pre-posttest design studies of case-control group<sup>47</sup>. When performed moderate aerobic exercise and resistance exercise 3 times a week to 87 patients scheduled colorectal cancer surgery who average age  $67.4 \pm 11$ , increasing the effect of functional recovery appeared.

Also in 2014, there is a randomization control-group pre-posttest design study which conducted by Gillis et al.<sup>9</sup>. When performed resistance exercises, nutritional counseling with protein supplementation and relaxation exercises initiated either 4weeks to patients who are scheduled colorectal resection surgery for cancer, and the average age  $65.7 \pm 13.6$  for the total of 77 patients, increasing the effect of functional exercise capacity was showed.

### **B. Korea State through Survey**

In this study, we conducted a survey to find out the purpose of recognition and state on prehabilitation of 118 people of D city and S city. In the survey, the majority more than 80% about the rehabilitation seen a lot of due to specialized books or lecture, they experienced directly in the physical therapy room of the hospital. However, while people who know the prehabilitation has 52%, "A lot" has 21%. The path which was learned mainly specialized publications, about 44 percent of people have experienced it responded to "A little". This awareness of the rehabilitation and prehabilitation showed significantly different. Currently, the idea of the rehabilitation progress after surgery to the patient is important and their effects well known<sup>3,11,18,62,63,64</sup>. Effects on prehabilitation were questions about whether a patient education program before and after surgery because of the relatively low awareness. After surgery training program that respondents who have 40%, the degree of improvement after operation training program which evaluated by they is accounted for 60% to "little effect", that have shown that in fact have an effect. However, people who do not know about training programs after surgery on their hospital was 36%. Who responded that having preoperative training program had only 9%, that among them appeared effect and answer a person is 53% and (no effect) and answer one person to 47%, exist of the effect could not be found. In addition, because "Have no idea" has 54% of the most common groups, the survey was to get characters "Does the institution (or clinic) your work for give patients before surgery education program?" for Korea trend is clearly shown. Accordingly, after described the definition to the participants to inform necessity of prehabilitation which the core of this paper, last items are surveyed. First, after an explanation we were determined that understood all based on "did not understand" and "not at all" responds to 0%. The researchers' field "correlation of physical therapy" the "A lot" has 74% and "A little" has 18%, they showed that the result has a very high relevance. Because of the high relevance it has responded that the items necessity of prehabilitation that were "Yes" 89%, and 85% responded that "Because prehabilitations is effective in treatment of patient". Therefore, because prehabilitation is accelerating the speed of recovery, prevent complications and shorten the length of hospital stay and a good surgical outcome in patients, to obtain a high quality of their lives, the patients are considered essential to the process.

Surprisingly in this question of "If it is introduced, how are you going to make a program with it?" people who respond the "trial will not do" showed 0% with very positive results. Although this awareness of prehabilitation is significantly lower in Korea, preoperative education program being implemented by some therapists, but not defined the protocol so it is difficult named prehabilitation. Through this survey proves that medical personnel in Korea are to be introduced very soon felt the need to know the effects of prehabilitation. Prehabilitation is also more expansion suggests that it should be implemented with expertise in the field of physical therapy. And now, in addition to movement it exists, therapists and more directly study the prehabilitation, thinks more effective treatments and that patients taking the lead to show the results improve the quality of life. However, In the survey study limitation, the state of Korea in the limited area is hard generalize because of the 118 small number of participants of S city and D city in Korea.

### **C. Compared to the US and Korea in Prehabilitation**

This comparative study read a paper on cancer prehabilitation in the United States, investigate further and, at the same time against the prehabilitation in Korea was to investigate whether what research is being conducted. Articles search site search was conducted through Pubmed in the United States and the Korea science and research information services research information sharing service(RISS). As in Pubmed 'prehabilitation' search results, including 108 for the definition and meaning of prehabilitation equals 'preoperative', 'prephylactic' are included 'physical therapy' concepts and meanings that are connected to the word 'exercise (therapy)', 'prevention', 'training' 'rehabilitation', etc. have been added to the search results of the search a large number of papers. However, we could find only two search about prehabilitation in RISS, result only two of prehabilitation, preoperative rehabilitation in Pubmed results similar with Pubmed, but the results are for the rest of the word search has been relatively very small number. Using the exercise, training, etc. to the patient before surgery, including prehabilitation in United states realized that doing a lot of research. But in Korea, there are not papers what performed physical therapy before surgery to patients and papers what used prehabilitation word are a few. In addition, two papers on prehabilitation in Korea is evaluate the effectiveness of community visit rehabilitation program for the prevention of disability developed of weak elderly conducted by Park et al. in 2010<sup>15</sup>. It is business that Visiting to home of the weak elderly establish the foundations for purposes to be actually carried out in the public health care institutions to help the rehabilitation. Subjects of this study were phase, strengthen the muscle for three months, exercise management programs of weak elderly focus on improving walking ability and balance skills enhancement is proceeded once a week, and rehabilitation performed every time averaged 40 minutes at home by visiting managing received. Subjects showed effects on improving physical performance and emotional functionality through the program and appeared a significant protective effect to degradation caused by repeated falls and falls degradation. Through a number of the research proper nutrition management, rehabilitation, comprehensive health risk management, and inhibit the progression of, or weak states are also effectively prevented the occurrence of disability have been reported.'. But In this studies is defined "New concept known as prehabilitation is physical therapy before surgery. It is good for rapid recovery after surgeries, preventing complications, reduction of hospitalization period by 'performing physical therapy such as respiratory exercise, aerobic exercise, muscle strengthening, physical electrical treatment and etc., to patients'. Through prehabilitation, recuperative powers are improved after surgery and patients enjoy high quality of life." In the above papers dealt with the meaning of prehabilitation it is being interpreted differently. Therefore, the above paper entitled preventive rehabilitation exercises, such as the prehabilitation does not fit in. Thus, the program of study or hospital for prehabilitation that are currently listed in Korea is more research and attention is necessary because very few. Also, be established the exact concept, should be aware that further action necessary for all patients.

In foreign countries, including the United States, and so enforcement and an exercise program to prehabilitation and preoperative patient study found that the activity also actively underway. In South Korea, on the other hand, low awareness of the comprehensive prehabilitation when the paper search and survey, showed clearly that not even study on preoperative physical therapy and exercise programs. The point was not all inclusive was the correct concept of the prehabilitation in South Korea and the United States. To strengthen the surrounding area before surgery or surgery that purpose and to enable the feature, in order to prevent complications after surgery intention that is like, but research is more accurate for such definition, the reason, the necessity of prehabilitation was not found. Accordingly, this study was to establish the definition of prehabilitation and summarized by examining the effect on the system by the party informs the necessity of prehabilitation. In addition to allowing depth of field studies about the effects and how this

development is a broad prehabilitation hope expanded on a larger scale in the physical therapy field in Korea. Also, rehabilitation is called "Jaehwal" in Korean, prehabilitation should desire earnestly to be known as "yehwal" because it is a compound word have means preventive rehabilitation.

Prehabilitation has proven to show good results analyzed by musculoskeletal, cardiopulmonary, urogenital and the other cancer system after surgery to the patient scheduled for surgery in the papers. In addition, in order to have an interest in pre-operative physical therapy from the United States to abroad, researches are actively progressed to reveal its effect. However, because there was a clear definition can be not found in the present study, we were to analyze and summarize a number of papers, finally is defined. If implement according to this concept by taking advantage of prehabilitation underwent complex rehabilitation after the surgery, and physical therapy may be more healthier and bring to the South Korea a bright future. Therefore, Korea is required to a more deeper study of the prehabilitation. Accordingly, Korea physical therapist should be introduced as soon as possible aware of the need for prehabilitation.

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## Relation between Self-Leadership and Core Competence of Nursing Students

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### Abstract---

**Background/Objectives:** This study was a descriptive survey, which aims to understand the relation between the self-leadership and core competence of nursing student.

**Methods/Statistical analysis:** The study subjects are 244 students who attend the Department of Nursing Science of M university in M city. The data collection period was from October 15th to November 15th, 2015. The collected data was analyzed by t-test, ANOVA, Pearson's correlation and multiple regression analysis.

**Findings:** As for the study result, self-leadership and core competence had quantitative correlation ( $r=.687$ ,  $p=.000$ ), the self-leadership factors influencing the core competence were natural compensation ( $\beta=.358$ ,  $p=.000$ ), self-establishment of goal ( $\beta=.231$ ,  $p=.000$ ), and self-communication ( $\beta=.137$ ,  $p=.009$ ).

**Improvements/Applications:** This suggests that the nursing student is insufficient in converting the difficult situation by thinking in constructive way. Therefore, there is a need for development program which will help them to nurture self-improvement and competence.

**Keywords---** Nursing Student, self-Leadership, Core Competence, Self-Communication, Multiple Regression.

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## **I. INTRODUCTION**

### **A. Need for the Study**

Modern society needs members of organizations who have core competence as well as expert knowledge and skills. Recently, colleges are increasingly interested in raising creative and autonomous people and developing the ability to use one's knowledge, attitude, and value depending on various and complex situations<sup>1,2</sup>.

Especially, students of nursing college learn practical knowledge and experience that are required for nurses, values and attitude, the role of professional nurse through the acquisition of expert knowledge and clinical practice<sup>3</sup>. So one can consider self-leadership, the course through which graduates of nursing school can motivate themselves, influence and lead themselves in order to fulfill tasks offered in clinical settings while serving the role of professional nurses after graduation.

Self-leadership is a process through which people improve various abilities mentally, physically, and socially, influence themselves, and raise themselves to be performance-oriented humans<sup>4</sup>. Especially, nurses have many chances to exert the ability to respond to situations immediately and use leadership, so nurses should have self-leadership that helps them to be leaders who represent their organization<sup>5</sup>. Self-leadership is individual characteristics, differs from person to person depending on his or her potential, and can be developed or improved through learning and education, so it is necessary to understand the capacity of self-leadership of students of nursing school<sup>6,7</sup>. Also, it seems necessary to offer self-leadership education to students of nursing school to improve the capacity of self-leadership of nursing students.

Self-leadership offers strategies for finding a job and interests in study, leads to better performance, raises level of academic satisfaction, enhances level of satisfaction about one's major, makes people have responsibility and move forward toward one's goal with autonomy and passion, bringing a positive influence on personal growth<sup>8</sup>. Individuals with high self-leadership have a more innovative and creative tendency, which is reflected in their completion of work and leads to innovative and creative performance results<sup>5</sup>.

Previous studies on self-leadership of nursing students include self-leadership, stress from clinical practice, and the capacity of performing clinical practice<sup>2,9</sup>, the relationship between self-efficacy and empowerment<sup>10</sup>, awareness of learning<sup>11</sup>, and critical thinking skill and problem solving ability<sup>12</sup>.

Korean Accreditation Board of Nursing Education recommends improving the quality of nursing education through continuous improvement of nursing education programs to cultivate students with core competence so that they will be able to fulfill their roles with creativity, autonomy, and responsibility as professionals<sup>13</sup>. Core competence is the ability to effectively resolve problems in various situations and it refers to knowledge, skill, and attitude required for learners<sup>14</sup>. So if core capacity is the ability required for everyone to lead their life successfully, it is necessary to find out what are core capacities required for college students and how they are cultivated.

Choi & Kim<sup>15</sup> reported that elements affecting the core capacities of nursing students are the tendency of critical thinking, level of satisfaction about one's major, and level of satisfaction about practice, while Lee et al.<sup>16</sup> maintains that nursing students need the capacity for international health, which is appropriate for the era of globalization.

So in order to raise the capacity of self-leadership of nursing students, it is necessary to find out what is the self-leadership needed for students and what is the core competence required for students, and the relationship of the two. To this end, this study tries to provide base data for developing self-leadership programs for nursing students by exploring self-leadership and core competence of nursing students and identifying the relationship between each elements of self-leadership and core competence.

### **B. Purpose of the Study**

This study aims to find out the relationship between self-leadership and core competence of nursing students and the detailed purposes are as follows.

- 1) It understands self-leadership and core competence of nursing students.
- 2) It finds out the correlation between self-leadership and core competence of nursing students.
- 3) It finds out the influence on core competence of nursing students.

## **II. METHODS**

### **A. Design of the Study**

This study was a descriptive survey which aims to understand the relation between self-leadership and core competence of nursing students who currently attend the department of nursing science.

### **B. Participants**

The study subjects are 244 students who attend the Department of Nursing Science of M university in M city.

As for the sample size of research, GPOWER 3.1.2 programs was used to calculate the required sample number for 0.15 effect size, 0.05 significance degree and 0.90 test power, which was minimum 99 people, but conducted survey to 250 people, and utilized total 244 survey as final analysis material excluding 6 surveys with too much missing value.

### **C. Research Instruments**

#### **Self-Leadership**

As for the self-leadership evaluation tool, the one Shin, Kim & Han<sup>17</sup> supplemented and revised based on RSLQ (Revised Self-leadership Questionnaire) developed by Hough & Neck<sup>18</sup> was utilized. his tool is composed of 9 subcategories of 35 questions: 5 questions on setting one's goal, 3 questions on self-compensation, 4 questions on self-observation, 2 questions on self-condition, 4 questions on self-punishment, 5 questions on imagining successful performance, 3 questions on self-conversation, 4 questions on belief and assumption analysis, and 5 questions on natural reward. Each question ranges from 1 point, representing 'not at all' to 5 points, meaning 'very much' and the score ranges from 35 to 175, with higher score referring to higher level of self-leadership.

At the time of developing the tool, the level of reliability of subcategories was Cronbach's  $\alpha$  = .70~.87. In this study, Cronbach's  $\alpha$  was .87 and Cronbach's  $\alpha$  of each category was .67~.82.

#### **Core-Competence**

As for the core competence scale, Lee's<sup>19</sup> Expert-CAP (Competency Assessment) was utilized. As for the tool, there were 5 subcategories of 26 questions: 5 questions on leadership, 8 questions on self-innovation, 5 questions on the ability of interpersonal relationship, 5 questions on problem solving, and 3 questions on focusing on academic performance. In this study, Cronbach's  $\alpha$  was .91 and Cronbach's  $\alpha$  of each category was .64~.78.

### **D. Data Collection**

For this study, data was from October 15 to November 15, 2015 at M University located in M city. The researcher explained the necessity and purpose of this study to the subjects, received written consent from nursing students who agreed to participate in the study, and data was collected. About 15 minutes were taken for the survey and completed questionnaires were kept in sealed envelopes and the researcher collect them.

### **E. Data Analysis**

The collected data were analyzed using the SPSS/WIN 21.0 statistical program, and the percentage, mean, and standard deviation of the general characteristics and self-leadership, core competence were analyzed. The self-leadership and core competence in accordance with the general characteristics of the subject was analyzed by t-test and ANOVA. Self-leadership and core competence analysis adopted Pearson's correlation coefficient, and the influential factors to core competence adopted multiple regression analysis.

## **III. RESULT**

### **A. General Characteristics of the Participants**

The general characteristics of subjects are shown in "Table 1". The study result showed there were 136 freshmen (55.7%), 108 sophomores (44.3%), average age being 19-24 (93.9%). Most were female (82.0%), many respondents had no religion (64.8%) and majority were participating in club activities (64.8%). As for academic performance, 74.6% answered they were in the medium level and as for satisfaction about major, 44.7%, the majority, said satisfied.

**Self-Leadership, Core Competence based on the General Characteristics of the Participants**

Self-leadership of subjects showed significant difference depending on religion( $t=2.046, p=0.02$ ) and satisfaction about major( $F=11.343, p=.000$ ). Core competence of the subjects showed significant difference depending on age( $t=-2.673, p=.008$ ), gender( $t=2.662, p=.008$ ), and satisfaction about major( $F=8.499, p=.000$ ). See "Table 1".

Table 1: Self-leadership, Core Competence based on the General Characteristics of the Participants (N=244)

Characteristics		N(%)	Self-leadership			Core competence		
			Mean ± SD	t/F	p	Mean ± SD	t/F	p
Age(yr)	19-24	229(93.9)	118.73±13.66	-.807	.421	82.66±10.09	-2.673	.008
	≥25	15(6.1)	121.86±19.83			90.29±14.40		
Gender	Female	200(82.0)	118.53±13.28	.931	.353	82.22±9.71	2.662	.008
	Male	44(18.0)	120.70±17.05			86.81±13.01		
Grade	Freshmen	136(55.7)	118.46±14.01	-.573	.567	82.60±11.39	-.744	.458
	Sophomores	108(44.3)	119.50±14.08			83.61±9.29		
Religion	Yes	86(35.2)	121.40±13.36	2.046	.042	84.41±11.68	1.494	.137
	No	158(64.8)	117.58±14.23			82.31±9.76		
Club	Yes	158(64.8)	118.85±13.77	-.112	.911	83.48±10.52	.857	.392
	No	86(35.2)	119.06±14.53			82.27±10.48		
Academic achievement	High	19(7.8)	122.32±11.67	.608	.545	88.32±8.88	2.978	.053
	Middle	182(74.6)	118.68±13.11			82.32±9.99		
	Low	43(17.6)	118.41±18.24			83.79±1.61		
Satisfaction about major	Great Satisfaction	20(8.2)	125.80±12.71	11.343	.000	85.70±11.67	8.499	.000
	Satisfaction	109(44.7)	122.84±12.64			86.09±10.17		
	Fair	97(39.8)	114.94±13.53			80.18±9.52		
	Dissatisfaction	18(7.4)	109.71±15.41			77.18±10.50		

**B. Self-Leadership and Core Competence of the Participants**

Self-leadership of the subjects was  $3.39±0.40$  and core competence of the subjects was  $3.39±0.40$ . See "Table 2".

Table 2: Self-leadership and Core Competence of the Subjects (N=244)

Variables			Mean±SD	Mean±SD	Mean±SD
			Freshmen	Sophomores	
<b>Self-leadership</b>			2.36±0.32	2.39±0.27	3.39±0.40
Behavior-focused Strategies		Self-goal setting	3.37±0.56	3.41±0.59	3.37±0.58
		Self-reward	3.19±0.66	3.84±1.44	3.81±1.07
		Self-observation	3.41±0.67	3.48±0.65	3.45±0.66
		Self-cueing	3.4±0.62	3.27±0.65	3.34±0.61
		Self-punishment	3.49±0.60	3.4±0.57	3.45±0.58
Natural reward strategies		Focusing on natural rewards	3.28±0.58	3.38±0.58	3.29±0.4
Constructive thought pattern strategies		Visualizing successful performance	3.34±0.62	3.30±0.61	3.32±0.66
		Self-talk	3.21±0.72	3.38±0.70	3.29±0.71
		Evaluating beliefs and assumptions	3.27±0.63	3.10±0.52	3.32±0.59
<b>Core competence</b>			3.17±0.44	3.22±0.36	3.39±0.40
Leadership			3.03±0.59	3.17±0.63	3.09±0.61
Self-innovation			3.01±0.49	3.09±0.44	3.05±0.47
Interpersonal relationships competency			3.48±0.54	3.38±0.41	3.56±0.48
Problem solving competency			3.26±0.46	3.26±0.41	3.26±0.44
Performance concentration			3.21±0.58	3.25±0.55	3.19±0.40

**C. Correlation between Participants' Self-Leadership and Core Competence**

Self-leadership and core competence had positive significant correlation at significance level of 1%. See "Table 3".

Table 3: Correlation between Self-leadership and Core Competence of the subject (N=244)

	Self-leadership	Core competence
Self-leadership	1	.687 * * (.000)
Core competence		1
*p<0.05, **p<0.01		

**D. The Effect of Self-Leadership on Core Competence**

To identify the sub-domain of self-leadership that affects the core competence of the subjects, a multiple regression analysis was conducted, with core competence as the dependent variable, and the nine sub-domains of self-leadership as the independent variables.

The result of analyzing multicollinearity showed that tolerance limit was .481~.916 and variance inflation factor(VIF) was 1.09~2.08, indicating no problem in multicollinearity. The influence of self-leadership on core competence is shown in "Table 4". The self-leadership factors influencing the core competence of college students were natural compensation ( $\beta=.358, p=.000$ ), self-establishment of goal ( $\beta=.231, p=.000$ ), and self-communication ( $\beta=.137, p=.009$ ), and these variables had 56.5% of explanation power in core-competence.

Table 4: The Effect of Self-Leadership on core Competence (N=244)

Self-leadership	Core competence		
	$\beta$	t	p
Self-goal setting	.231	4.202	.000
Self-reward	.022	.486	.627
Self-observation	-.061	-1.330	.185
Self-cueing	.091	1.527	.128
Self-punishment	.107	1.736	.084
Focusing on natural rewards	.358	6.433	.000
Visualizing successful performance	.042	.679	.498
Self-talk	.137	2.620	.009
Evaluating beliefs and assumptions	.063	1.184	.238
R <sup>2</sup> =.565, F=33.792, p .000			

**IV. DISCUSSION**

This study was conducted to find out the correlation of self-leadership and core competence of nursing students and the kind of core competence affecting self-leadership, so it will provide base data for developing education programs to improve self-leadership.

The self-leadership that the subjects of this study perceived marked an average of 3.39 out of 5. In previous studies, self-leadership of nursing students measured with the identical tool marked 3.43<sup>11</sup> and 3.72<sup>20</sup>, and self-leadership of general students was 3.44<sup>21</sup>, showing the subjects of this study had lower level of self-leadership. Especially, self-leadership of nurses marked 3.61 in two studies<sup>22,23</sup>, showing nurses' self-leadership level was higher than that of college students. Kim et al.<sup>22</sup> found that self-leadership is higher for nurses with longer work experience, nurses with responsibility, and those who received leadership education. This may look like a natural result but it seems significant in preparing measures to improve self-leadership of nursing students. So, for nursing students, group activities and various opportunities and experiences such as leadership education seem to help improve self-leadership.

Among the 3 strategies of self-leadership, action-focused strategy scored the highest, 3.48, which corresponded with the findings of previous studies<sup>11,24</sup>. In a study targeted nurses<sup>22</sup>, among the 3 strategies, natural reward strategy marked the highest, which was a different result from studies targeting nursing students. It showed that nurses synchronize their work and activities with pleasant aspect of their work and adjust them to be positive aspects of their work. In subcategories, self-reward marked the highest and self-conversation was the lowest, which was the same result with the study of Lee, Lee & Kim<sup>11</sup>, so it supported the findings of this study. This shows that the subjects reward themselves after completing tasks successfully but they lack the thinking skill of converting difficult situations to a constructive way. So it seems to be necessary to come up with systematic educational and training programs that will improve self-awareness and positive thinking for nursing students.

As for the subcategories of core competence of nursing students, ability of interpersonal relationship topped the list followed by problem solving ability, and self-innovation was at the bottom. Self-innovation is the subcategory that refers to being able to adjust to changes, meet challenges with confidence, and learn 2 or more foreign languages to have competitiveness. These are the essential core competences required for nurses in the field of health and medicine that is becoming more and more globalized. However, in this study, it was found to mark the lowest among subcategories of core competence for nursing students, implying the urgent need for systematic preparation and education for nursing students to become competent nurses appropriate for globalized era. A previous study<sup>25</sup> found core competences needed for current undergraduate students are knowledge of expert area, the ability to learn, creativity, logical thinking, the ability of interpersonal relationship, leadership, formation of values and attitude. Among these core competence that is being developed well is knowledge of expert area, the ability to learn, and logical thinking while the least developed core competence is values and attitude, creativity, leadership, and the ability of interpersonal relationship<sup>25</sup>. It is hard to compare this study with the above mentioned qualitative study, but as this study showed leadership as the lowest core competence, it indicates the need for various strategies to develop leadership of college students.

The analysis of correlation between self-leadership and core competence, there was significant positive relationship ( $r=.667$ ,  $p=.000$ ), showing nursing students need to pay more attention to raise core competence to improve self-leadership. Among core competences, problem-solving ability is the cognitive process through critical thinking. Self-efficacy had a positive relationship with the tendency of critical thinking<sup>26</sup>, and as self-leadership is higher, self-efficacy is higher<sup>10,27</sup>. This means the approach to improve self-efficacy of nursing students can be a strategy to enhance self-leadership along with problem solving ability, one of the core competences.

Lastly, elements of self-leadership that affect core competence of nursing students were found to be natural reward, setting one's goal, and self-conversation. That is, the positive emotion about life will help pioneer the current life, and self-leadership strategy to set a goal and encourage oneself strengthens core competence, letting nursing students have more active and positive experience, and helping them grow into nurses with self-leadership and core competence.

Based on the study result, it was found that self-leadership is not a fixed trait, but learned behavior and focuses on how one should behave<sup>28</sup>, so self-leadership improvement programs considering self-leadership of nursing students should be implemented. Especially, there need to be programs that can enhance self-awareness and positive thinking of nursing students.

## **V. CONCLUSION AND IMPLICATIONS**

This study tries to understand the correlation between self-leadership and core competence of nursing students and provide base data for developing education programs to improve self-leadership of nursing students. The result showed that self-leadership of nursing students had an influence on core competence. So it is required to develop programs considering the abilities of self-leadership that are helpful for improving core competence of nursing students. This study had the limitation that it targeted nursing students of one region and chose subjects among freshmen and sophomores, making it hard to generalize the results. Following studies should be comparative ones targeting various school systems and school years.

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## Utilization of Match Making System for Improving Second Language Learning Efficiency

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### Abstract---

**Objectives:** The recent trends of a nowadays second language learning focuses on making a user friendly environment for every language learners. For example, how can people get access to the learning material and content more easily and accurately. In this paper, we explore some effective ways that have positive effect on improving learning effect.

**Methods/Statistical analysis:** Thanks to the help of the current information society, it has become somewhat easier for second language learners to get their hands on the online learning material and contents. But the problem is that people don't have the same ability for understanding the information which was given to them since each individual shows different learning aptitude and level or some might even have a different point of view on language learning. Therefore, matching the findings with the learner's capability is the key feature that makes second language learning more efficient and meaningful. Developing a system that identifies user level and determines what information to give out or not will definitely have some kind of positive effect on providing level-wise learning material and content for the sake of learners.

**Findings:** Detecting study materials and understanding them is not quite the same. Some learners may feel frustrated with the provided information even though the search engine gave the right output according to its importance. Proposed system model(MMs) offers a higher efficient language learning material to satisfy learners at any level compared with the existing model. It utilizes cloud computing for gathering information for it has many advantages for storage capacity and accessibility compared with the traditional systems. It also matches the information with the level of each user to customize it for maximal purpose.

**Improvements/Applications:** Customization of a well-organized second language learning materials makes the provided information more meaningful. Learners will feel less exhausted in the process of self-directed learning.

**Keywords---** Customized Second Language Learning Material, Cloud Computing, User Level Determiner, Level-Wise Learning, Learner-Friendly Environment.

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## I. INTRODUCTION

In a computerized modern society, anyone can easily use computers or mobile devices to search and utilize various learning materials for learning a foreign language. These learning materials have a great advantage since there is much less spatial and temporal constraints when learners try to use them for their learning. However, unconditionally large amount of information doesn't guarantee learning efficiency improvement in the real world. The outcome of Second Language Learning can differ by learner's learning objectives, level, and aptitude<sup>1</sup>. Therefore, offering learners with an appropriate degree of difficulty and recommending the right amount of learning information through preliminary research on each learners' aptitude to give a certain amount of tension in their learning process can have a positive effect on increasing learning efficiency<sup>2</sup>. In order to improve the competency of each individual, we propose a system that makes use of each learners' learning maturity, objectives, and aptitude to offer the best learning opportunities for any learners of foreign languages.

The system we propose first concentrates on finding and collecting diverse on-line learning materials or contents then transmitting the finding to be stored on a cloud system. Once the data is stored, it is classified into practical, examination, major related and special purpose type by sorting out details to give learners easy and instant accessibility for the right information they need. Finally, when there is a request from users, the system analyzes the user's request thoroughly to send out optimized information. In the process of sending out the learning information, the system checks the personal user data to estimate the level and stage of each individual then analyze the field and type of requested information to pick up the information that is most suitable. The selected information is sent out in a systematic order that shows importance and usefulness. One of the most troublesome issue is that locating appropriate material isn't that easy<sup>3</sup>. The system we propose can not only offer a level-wise learning opportunity but also an optimized information by monitoring the whole learning process which contains how much each learner's understand, study and what type of interest they have. We hope that the suggestions in our study can be a breakthrough that makes the process of learning a bit easier for anyone interested in Second Language Learning.

## II. BACKGROUND AND RELATED WORK

### A. Cloud Computing and Big Data

Cloud is a system that enables users to adapt to various IT resources included in a shared pool such as server, storage, application, service etc. by using client devices. It is generally categorized into three types- Public Cloud, Private Cloud, Hybrid Cloud<sup>4</sup>. When Data Security or Control over the computing resources is necessary, Private Cloud is used and in other cases Public Cloud is the usual option. The following table 1 shows the common characteristics of each cloud system<sup>5</sup>.

Table 1: Ccomparison of Public Cloud and Private Cloud

Property	Public cloud	Private cloud	Hybrid cloud
Elasticity	0	Δ	Δ
Measurable service	0	0	0
On-demand service	0	Δ	Δ
Network access	0	Δ	Δ

The term Big Data refers to a massive amount of data which goes beyond the limit of acceptable range of software that process, store and manage in a given time<sup>6,7</sup>. Anticipating the flow of information by analyzing the datasets through collecting and processing various data is one of the main objectives of Big Data. The expandability and the flexibility is quite efficient in analyzing Big Data which produce unstructured information in real-time.

As a result, utilization of cloud computing in data processing makes it relatively easier to process a variety of online learning resources and operate such large amounts of data. This paper suggests a unified system that collects various second language learning information to form a cloud zone provided by educational institutions from elementary education to higher education and analyze the collected data to make it useful for any learners who need some help in language learning study<sup>8</sup>.

### B. Cloud Computing Service Model

The definition of cloud computing service model can be divided into the following three types of models.

- 1) SaaS(Software as a Service): The main capability of this service is to use the provider's applications on a cloud infrastructure. Including server, storage, network components and the software that is deployed across the system. Consumers do not have control over the cloud infrastructure except some user specific application.
- 2) PaaS(Platform as a Service): The capability of this service model is to provide the authority for deploying consumer created or acquired applications onto the cloud infrastructure that enables consumers to have control over the deployed applications.
- 3) IaaS(Infrastructure as a Service): Consumers receive the provision of processing, storage, networks, and some basic computing resources. Consumers can arrange personal software including operating systems and applications. Consumers don't have full control over the underlying infrastructure but limited control over a few networking components<sup>9</sup>.

### III. CLOUD BASED LANGUAGE EDUCATION SYSTEM

In this part, we explain the method for establishing Cloud based Language Education System. To show how the system works, we explicate the basic structure of the search system and how the components in the system work to process the collected data in order to make it more useful.

We also explain the function of individual components and what kinds of positive effects it has on Second Language Learning.

#### A. Cloud Zone Configuration

To accumulate effective datasets of Language-study materials, it is imperative to gather as many kinds of learning material and contents and integrate them into a form of Big Data based on cloud system<sup>10</sup>. In order to accumulate the learning materials according to the differentiated levels, online and offline education related data covering elementary, secondary, higher education and private institutions should be gathered and stored in the cloud system. In addition, a screening system that can remove duplicate, faulty or sometimes unnecessary data to improve the accuracy of the information must be added into the storage process. Also, a system controller that compensates insufficient resources can be an optional step in the storage process to ameliorate the efficiency and make learner-friendly environment.

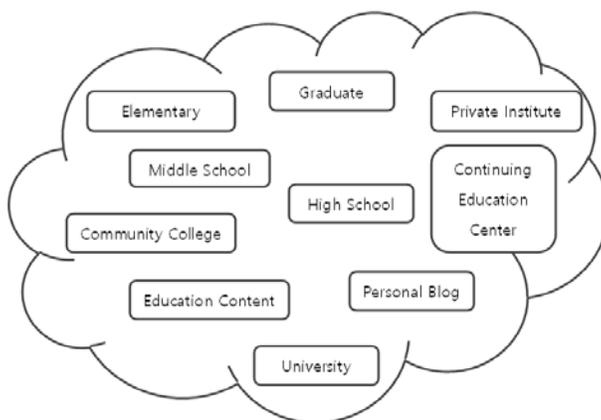


Figure 1: Cloud Zone

#### B. Process of the Proposed System

The system proposed in this paper is basically divided into two parts and exchange of information in real-time between the two systems is indispensable. The first part, a cloud zone, contains all kinds of learning material that was carefully gathered and stored. The second part is composed of a Search Engine system that provides suitable materials and contents to users. This search engine goes through enormous amount of data stored in the cloud zone to fulfill the needs of each individual. In other words, mutual cooperation between the two systems play a key role in match making the separated information to become the optimal information for any users since each learner shows different language learning aptitude. To obtain this

systematic procedure, learners' learning steps and levels must be pre-registered in the user registration stage. Since the proposed system is designed to make the best effort in providing the most suitable learning materials and contents by searching through the cloud zone, users must register their exact personal information including foreign language proficiency level, learning styles, reason for learning. Proposed system determines the user-level based on the registered personal information then search for and extract the user requests in the cloud zone. The extracted learning materials and contents go through a secondary categorization to be stored in the learning resource DB then transmitted to the matchmaker for matchmaking process. The matchmaker that receives both user info and extracted learning info analyzes and matches each information to make it customized and user friendly then sends out the optimized information to the individual users. The proposed system model is shown as Figure 2.

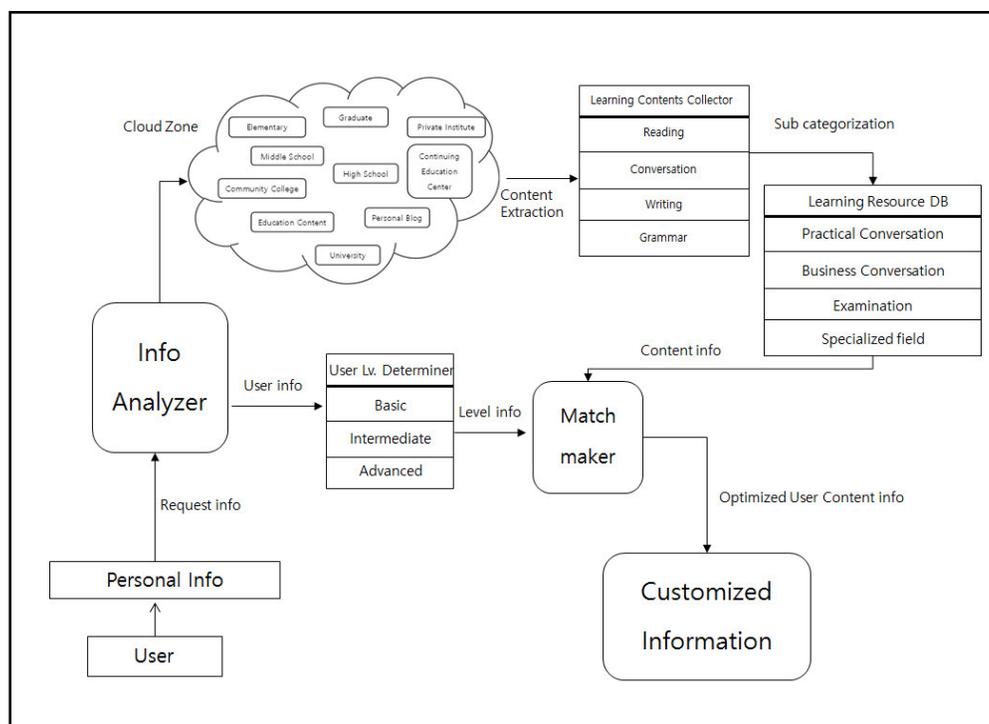


Figure 2: Match Making System

The following is the information processing procedures of the proposed system.

- 1) Users register personal learning step, level, strengths and weaknesses, area of interest in the system database before using the system.
- 2) Users log on to the system and request the necessary information.
- 3) Info Analyzer analyzes the requested learning information from the user and then transmits it to the Cloud zone and User Level Determiner.
- 4) User requests on learning contents are extracted from the cloud zone and transmitted to the Learning Contents Collector.
- 5) Collected learning contents go through information classification process and are stored in the Learning Resource DB.
- 6) Sub categorized learning resources are transmitted to the MatchMaker.
- 7) User Level Determiner thoroughly examine the details of user level based on the information transmitted from Info Analyzer and send out customized level information to the MatchMaker.
- 8) MatchMaker goes through a comparison analysis process and matches the information received from User Level Determiner and Learning Resource DB to make up the most efficient and optimized user-friendly learning information.
- 9) Individual users receive customized learning resources.

As we have described above, the MatchMaking system gathers as much information as possible from the Cloud zone and classifies it for the purpose of extracting the right kind of information to customize the final

information to be transmitted to the users. During the process, a secondary analysis that determines the level and stage of each user classifies learning information into specific category to make sure that it is ready for matchmaking. Going through a number of steps makes the information more accurate, more suitable, more level-wise and second language learners will benefit from the customized learning information that is designed to improve learning effect efficiency.

#### IV. EVALUATIONS OF SUGGESTED MODEL

In this part, we will check the effectiveness of the existing model and the proposed model and show the difference in the two systems. The proposed model shows some predominance in language education over the existing system. The existing model evaluation in Table 2 is a quotation from an earlier study of language education system<sup>11</sup>.

Table 2: Comparative Analysis of each Model

Category	Existing Model	Proposed Model
Data collection path	various	various
Data Storage	0	0
Data Analysis	0	0
Usability Evaluation	Δ	0
Information Customizing	X	0

The existing model(BDLEs) and the proposed model both function as a useful tool for providing learning material and content to second language learners<sup>11</sup>. Though a significant difference exists in the value of information provided to the users..

First, the existing model chooses a certain information provider and picks up the data from that organization and searches for deficient information randomly from outside online environment to build up the database needed for providing learning materials and contents. On the other hand, the proposed model build up a huge cloud zone by binding the database from accredited education institutions. Data collected in this method is more reliable since the education institutions goes through primary error correction and complementation. In addition, the proposed system runs a secondary error correction and complementation during the collecting process to upgrade its instructiveness. As a result, the information that is provided to users will be double checked to make sure that the quality of the information it offers is quite accurate and useful in improving language learners' proficiency.

Second, utilizing the cloud for storing data resolves the constraints of the storage space. Also, there will be no temporal and spatial limitation from the user's point of view since anyone can have easy access on the system on condition that wired and wireless network is available.

Lastly, the existing model only provides information based on the priority determined by priority determiner. But in some cases, if the proficiency of the user is not good enough to understand the provided information, it might just cause confusion to those who were expecting some help from the system. Whereas the proposed system systematically determines what kind of learning material and content information to be provided by comparing the user level and information level. In result, the proposed system offers a level-wise learning information in a fashionable way not to make disappointed users turn their backs on the system. The capability to control the amount of workload provided to users according to the learning aptitude of each individual is another advantage contained in the system.

#### V. CONCLUSION

Our world has developed into a mobile networking society and people obtained easier access to endless information which is created 24 hours a day. In an information society like ours, anyone can search and utilize necessary information unless it is a top secret. However, complementary solution is needed to utilize and handle the enormous amount of the generated information in order not to make the data meaningless. Therefore, various education institutions must cooperate with one another to give satisfactory solution for the public interest.

To achieve the goal dealt in this study, a following study of a method for devising a detailed measure for collecting information which are scattered in various educational organizations is imperative. It is also necessary to know that eliminating duplicate resources and errors is as much important as gathering and

utilizing data. Therefore, a following study should lay emphasis on developing a system for getting rid of the obstacles in providing customized information and improving the accuracy of the user level determination process..

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## Study on Lower Level Students' Learning Styles (Focused on TOEIC Listening Comprehension)

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### Abstract---

**Objectives:** This research is focused on lower level students' learning styles, particularly with regards to their listening comprehension. To overcome difficulties in an EFL context, lower level students should try to find learning styles that are suitable for them. This research aims to investigate the possibility of identifying learning styles based on students' learning motivations.

**Methods/Statistical analysis:** To collect the data, several instruments were used. These were pre- and post- TOEIC listening tests, and two questionnaires, one dealing with learning styles and the other with students' English learning motivation. The collected data were analyzed using the statistics program SPSS (version 18.0), reliability analysis, and independent sample t test.

**Findings:** Lower level students' learning styles were significantly dependent on their learning motivation. Especially, extrinsic motivation plays a more crucial role for students than intrinsic motivation. Also, learning motivation for females is higher than males. Learning styles that lower level students preferred are teacher-centered, reflective first, but changed to active and global. They also preferred Top down rather than Bottom up with extrinsic motivation.

**Improvements/Applications:** In Korea, most of the lower level students' English learning styles are passive, top-down, and forced by extrinsic, rather than intrinsic motivation. However, depending on the techniques and practices of the instructor in the class, students altered and modified their learning styles. Therefore, understanding students' learning styles is crucial in making them motivated and ensuring their progress in English.

**Keywords---** Learning Styles, Learning Motivation, Top-Down, Extrinsic Motivation, Intrinsic Motivation.

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## I. INTRODUCTION

There has been an increasing emphasis in the importance of communication in English. The students' role in the classroom has been changing, and teaching methods tend to be more practical. For a long time, teacher-centered classes have been the norm in English classrooms in Korea. Therefore, students are very passive, disinterested, and as a consequence, more ineffective. To address this problem, there needs to be some consideration of what students' individual learning styles are, and how to cater to these styles to increase their motivation to learn. Understanding these differences can help teachers adapt their teaching methods so as to be more compatible with students' preferred learning styles. So far, traditional methods have been mostly face-to-face, a teacher centered, uniform educational system. However, student needs have changed, and it has become necessary for teachers to provide different learning atmospheres. According to the preferences of students' learning styles, understanding different learning styles provide valuable awareness into the educational situation <sup>1</sup>. There have been some previous studies in students' learning styles with different cultural backgrounds<sup>2</sup>, and students' different learning styles within a Korean cultural background <sup>3</sup>. It is important to research students' learning style preference focused on students' achievement, and their levels. Therefore, the purpose of the present study is to investigate lower level students' learning style preferences based on their learning motivation, with emphasis on English listening comprehension.

Students' learning styles refer to personal differences, which are closely related to personal preferences <sup>4</sup>. Learning styles are defined as affective characteristics and physiological features that determine how students understand and interact in their learning circumstance<sup>5</sup>. According to Felder and Silverman, there are four aspects of learning styles: sensing and intuitive perception, visual and verbal input, active and reflective processing, and sequential and global understanding <sup>6</sup>. In the case of sensing style students, they prefer practical learning, such as clear data, and results from experiments. On the other hand, students who like intuitive learning styles prefer to rely on their internal affective states. There are two kinds of processing: one is active learning in which students participate well and enjoy discussing and commenting, and the other is a reflective one in which students like observing and being controlled. The aspect of input also plays a role in visual and verbal learning styles. Students who like drawing and graphs and charts tend to be visual and students who like words and sounds tend to be verbal. In the case of the understanding aspect, students who like gradual processing prefer a sequential learning style, and students who like whole comprehensive things prefer a more global learning style.

As students have various backgrounds of knowledge and abilities, diverse class designs should be considered to fit the situations <sup>7</sup>. It is important to offer different learning circumstances based on personal differences and needs. According to Field <sup>8</sup>, there are two approaches used when developing effective listening skills: one is top down and the other is bottom up. As shown in Figure 1, top down is a whole language approach in which students learn by contextualizing and using their knowledge in real situations. In contrast, bottom up involves mechanical drills without any background knowledge. Most Korean students are not familiar with the top down learning process but they are quite familiar with bottom up processing. As a result, seeing the bigger picture when performing listening activities is very difficult for them. Students who are accustomed to bottom up processing focus on listening for every detail of sound or word level<sup>9</sup>. For lower level students, top down processing is more effective in keeping students motivated to learn language listening<sup>10</sup>.

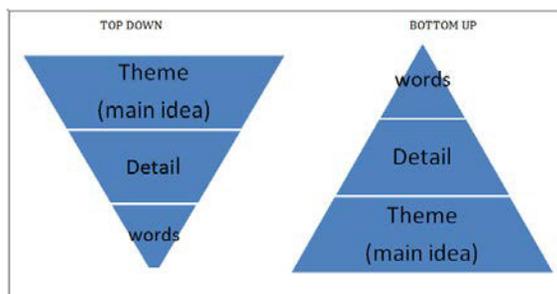


Figure 1: Top Down and Bottom up Learning Process

The research on students' learning motivation has been increasing steadily. According to Dörnyei, language ability and language learning motivation have been a focus of research since the 1960s <sup>11</sup>. There are

two main types of motivation: extrinsic and intrinsic. Extrinsic motivation refers to guidance by outer stimuli, such as reward, compliment, and punishment<sup>12</sup>. It was suggested that intrinsic motivation was a core motivator guided by interests in the educational process<sup>13</sup>. It referred intrinsic motivation as self-decision or self-efficacy<sup>14</sup>.

This study aims to find out the proper learning styles based on the learning motivation, especially for lower level students. As well, the present study attempts to explain that the importance of understanding students' learning styles, which may provide crucial clues as to why some students study and some do not.

### A. Subjects

The subjects of this study were 90 students from a university in Korea. These students participated in an elective general practical English course. This credit course was two-hours in length, taken once a week. After a pre-TOEIC listening comprehension test, the students were assigned to lower level classes. Students were mostly familiar with teacher-centered classes and bottom up learning strategies. Students were between 20 and 25 years of age, majoring in engineering, arts, and sports science.

### B. Procedure

To determine the lower level students' English learning styles, both top down and bottom up strategies were used. While the students participated in top down processes before the listening tasks, after doing the course material they performed various activities, such as predicting content from the pictures and communicating their predictions. After the listening, tasks, the students would discuss with their group members what difficulties they had during the listening activities. While the students were participating in bottom up process, they initially listened for understanding, looking for the main phrases that gave clues to the answers and focusing on linking, assimilation, and other targeted specific aspects. There were several class activities for the lower level students to keep motivated, such visual materials, guessing, verbal, information gaps, etc.

### C. Instruments

The collected data were analyzed using the statistics program SPSS (version 18.0), and reliability analysis.

### D. Data collection and Analysis

There were TOEIC listening comprehension tests that contained 4 different sections of listening questions. Students listened to questions and short conversations recorded in English, and answered questions as to what they heard. Also, in order to research students' learning styles and motivation, questionnaires were done. To investigate learning styles, the Felder and Silverman model was used. There are 12 learning style questions about listening that allow students to choose their learning preferences, and whether they preferred a top down or bottom up process. To find out students' learning motivation, there were 35 questions that dealt with the area of motivation, both extrinsic and intrinsic.

In this study, a survey in the form of a questionnaire was made to find out students' learning styles based on their motivation in English learning. The English learning style questionnaire used was adapted from<sup>15</sup>, and the English learning motivation questionnaire was adapted from<sup>16</sup>.

Table 1: Reliability of Learning Motivation

Motivations	Question Number	Cronbach's $\alpha$
Amotivation	3, 4, 12, 19, 22	.726
Extrinsic	16, 18, 30, 31, 33	.672
Intrinsic	2, 9, 14, 15, 20, 23, 32, 34	.864

As shown in Table 1, the Cronbach's  $\alpha$  of learning motivations is between .672 and .864 which shows that each subscale score met the recommended standard.

## II. RESULT

### A. Lower Level Students' Learning Styles

According to the Felder and Silverman model, there are 4 aspects of learning styles: sensing and intuitive perception, visual and verbal input, active and reflective processing, and sequential and global understanding [6].

Table 2: Learning Style Before the Experiment

Learning styles	Lower limit	Upper limit	Average	SD
Sensing	20.00	38.00	18	4.30
Visual	31.00	37.00	22	3.30
Reflective	31.00	44.00	45*	20.02
Sequential	32.00	44.00	47*	24.09

Table 2 shows the result of lower level students' learning style preferences before the experiments. These results showed that they preferred reflective (Average=45) and sequential (Average=47) learning styles.

Table 3: Learning Style After the Experiment

Learning styles	Lower limit	Upper limit	Average	SD
Sensing	20.00	30.00	16	3.60
Visual	31.00	36.00	22	3.30
Active	33.00	46.00	47*	21.02
Global	32.00	43.00	45*	25.01

However, Table 3 shows the learning style preferences after the experiments. Lower level students preferred active processes as the highest score of average=47. Students still liked sensing and visual but there were little changes from reflective to active and from sequential to global after the experiments.

Table 4: Learning Styles of Top Down and Bottom Up

Items	TD	BU	Total
Vocabulary	6	6	12
Predicting	12	0	12
Linking	6	6	12
Assimilation	4	8	12

Table 4 shows the result of top-down and bottom up learning processes for lower level students. There were 12 questions which asked the students' learning style preferences to find out their preferences for top down or bottom up processes. According to the result, students liked predicting contents from the pictures before the actual listening started. That is to say, students preferred a top-down process rather than bottom up as the highest number 12 of 12. In the case of process of assimilation, students preferred bottom-the up process rather than top down as the score of 8 of 12.

**B. Lower Level Students' Learning Motivation**

Table 5: Lower Level Students' Learning Motivation by Major

VARIABLE	Major (N:30)	M	SD	F	P
Amotivation	Engineer	0.80	0.729	1.702	.186
	Arts	1.05	0.742		
	Sports	1.08	0.676		
Extrinsic	Engineer	2.21	0.567	5.576	.004 **
	Arts	2.22	0.541		
	Sports	2.45	0.678		
Intrinsic	Engineer	2.21	0.684	1829	.158
	Arts	2.56	0.660		
	Sports	2.39	0.723		

\*\*p<.01

Table 5 shows the result of lower level students' English learning motivation by their majors. There are no significant differences in the area of students' majors of engineering, arts, and sports science. However, a significant difference can be shown in the area of extrinsic motivation as .004 (\*\*p<.01).

Table 6: Motivation Depending on Gender Differences

Motivation	Male		Female		t
	M	SD	M	SD	
	3.16	.57	3.20	1.03	.170

P>.05

Table 6 shows the result of lower level students' English learning motivation depending on gender differences.

In actuality, there is no significant difference between Male and female students. However, female students' value (M=3.20) is slightly higher than male students' one (M=3.16)

### III. DISCUSSION

This study proposed the importance of determining proper learning styles based on students' learning motivation, especially for lower level students. Before this study, students preferred their familiar learning styles, sequential and reflective as shown by table 1. However, at the end of the study, students learning preferences were changed. They still liked sensing and visual processing, but they changed their learning style preferences from reflective to active and from sequential to global. It means that most of the lower level students preferred having the teacher deliver knowledge first, a process which they are very familiar with. However, as they experienced new class activities with learning motivation, their preferences changed to a more holistic, comprehensive style. Most Korean students are familiar with teacher-centered classes, and a teacher's role in class was prioritized over the student's role. That is why students preferred bottom up learning styles first. Thus for lower level students, their learning motivation was minimal. As Table 5 shows, lower level students showed a preference for extrinsic motivation.

According to the result of lower level students' English learning motivation depending on gender differences, female students have slightly higher learning motivation compared to male students.

In conclusion, lower level students preferred 1) sensing, visual, active, -and global learning style, 2) top down learning processing rather than bottom- up, based on 3) extrinsic motivation.

This study has its limitations. With only the small number of subjects, it is difficult to generalize the results. For more meaningful research study, sample students should be expanded to include not only schools, but also learning environments outside of schools. Therefore, further research could include more varied and a larger sample size of students and research environments.

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# The Impact of Sports Participation and Academic Achievement on the Psychological Factors of High School Students in South Korea

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## Abstract---

**Objectives:** This study aimed to evaluate the effects of sports participation on the psychological factors of high school students in South Korea.

**Methods/Statistical analysis:** Using four separate multiple regression analyses, we examined whether there is any relationship between two major variables and four psychological factors among 198 high school students.

**Findings:** It was found that sports participation had a significant negative relationship with negative affect. The findings also showed a relationship between sports participation and school adjustment. Finally, the results indicated that there is a significant relationship between academic achievement and school adjustment.

**Improvements:** Overall, the major outcomes provided empirical support for the prediction that participation in sports is beneficial for students.

**Keywords---** Sports Participation, Academic Achievement, Psychological Factors, High School Students.

Note. This manuscript is based on a part of the first author's master's thesis from Hannam University.

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## I. INTRODUCTION

The effects of sports participation on various psychological factors have been investigated in secondary school students. Researchers have found that sports participation has a positive impact on academic achievement<sup>1</sup> as well as happiness<sup>2</sup>, and prevents persistent antisocial behavior<sup>3</sup>. Although a few studies have indicated no influence of sports participation (e.g., few relationships between aggressive behavior and team sport activities)<sup>4</sup>, the findings of major research studies have indicated that any sports involvement is a beneficial factor for young people<sup>5</sup>. As stated above, many studies have found empirical evidence for the positive effects of sports, yet it is still necessary to address this issue in culturally different contexts (e.g., in terms of direct and indirect participation in sports by South Korean high school students). Evaluating the impact of sports participation in the South Korean secondary school system, which regards academic performance as nearly unique, would be meaningful. The findings could provide insight specifically into impact in the South Korean education system.

Therefore, the purpose of this study was to examine the effects of sports participation on the psychological factors of high-school students in South Korea. To accomplish this purpose, the study assessed if any relationship existed between two major variables (i.e., Sports Participation and Academic Achievement) and four psychological factors (i.e., School Adjustment, Conflict Resolution Capabilities, Negative Affect, and Predisposition to Violence) among high school students. As such, two hypotheses were proposed:

- 1) There will be significant relationships between Sports Participation and the psychological factors of School Adjustment, Conflict Resolution Capabilities, Negative Affect, and Predisposition to Violence.
- 2) There will be significant relationships between Academic Achievement and the psychological factors of School Adjustment, Conflict Resolution Capabilities, Negative Affect, and Predisposition to Violence.

## II. METHODOLOGY

The present study used a drop-off survey as a primary data collection technique<sup>6</sup>. Participants were students enrolled in a high school in Daejeon, Korea. The survey was distributed to students enrolled in two high school courses. After obtaining the permission of the class teachers involved in the chosen courses, the researcher instructed each of them to ensure that the survey guidelines are followed<sup>6</sup>. In the classes, teachers explained the purpose of the study to all the students. During lessons, teachers explained the purpose of the study to all students. The students received a survey packet with a cover letter, the relevant scales, and selected demographic questions. They were then asked to fill out questionnaires immediately after the lesson. Each data collection session lasted approximately 10 minutes or less. A total of 200 surveys had been distributed. Of these, 198 surveys were returned, yielding a 99% response rate. Prior to the major data analyses, 22 surveys were deemed unusable, based on the exclusion criterion (i.e., surveys with more than five items not completed), bringing the total responses analyzed to 176 (in Table 1).

Table 1: Variables and Numbers

Variables		Numbers	%
Gender	Male	30	17.0
	Female	146	83.0
Academic Achievement	Upper	16	9.1
	Upper Middle	37	21.0
	Middle	66	37.5
	Lower Middle	38	21.6
	Lower	19	10.8
Total		176	100

The survey questionnaire was designed to test the designated variables. All scale items for this study were taken from five existing instruments. Because the original scales met the purpose of the present study, many were used without any major revisions. Only a few scale items were reworded to better fit the student sample. As a result, the survey items were as follows: 10 items from The Sports Participation scale<sup>7</sup> (in which the items were originally taken from original scales<sup>8,9,10</sup>), 15 items from the School Adjustment Scale<sup>11</sup>, 5 items from the Conflict Resolution Capabilities<sup>12</sup>, 7 items from the Disposition to Violence<sup>13</sup>, and 5 items from the Negative Affects<sup>14,15</sup>.

### III. DATA ANALYSIS PROCEDURES

The data were entered into the Predictive Analytics Software version 18.0 (SPSS Inc., Chicago, USA). Frequency statistics were initially used to provide the demographic information of the participants. For the initial analysis of the data, the Cronbach's alpha levels of the reliability coefficients were used to examine the five subscales in the survey. All Cronbach's alpha levels were over .80, indicating that each subscale met the recommended criteria <sup>16</sup>. As presented in Table 2, these findings indicated that the survey of this study was reliable.

Table 2: Reliabilities

Variables	Number of Items	Cronbach's $\alpha$
Sports Participation	10	.926
Conflict Resolution Capabilities	5	.892
Negative Affects	5	.764
Disposition to Violence	7	.826
School Adjustment	21	.929

To test the research hypotheses, four separate multiple regressions were conducted that examined whether Sports Participation and Academic Achievement influenced the four psychological factors (i.e., School Adjustment, Conflict Resolution Capabilities, Negative Affect, and Predisposition to Violence).

### IV. RESULTS

To test the hypotheses, four separate multiple regression analyses were conducted. Each analysis examined whether two major variables (Sports Participation and Academic Achievement) influence 1) Conflict Resolution Capabilities, 2) Negative Affect, 3) Predisposition to Violence, and 4) School Adjustment, respectively. Sports Participation and Academic Achievement served as predictor variables, while the four psychological variables served as dependent variables. Because there were no variables with 5% or more missing values, it was determined that missing data in the data set for these analyses was at an acceptable level, based on the prior recommendations <sup>17</sup>. The multiple regression analyses are presented below.

Table 3: Multiple Regression Analysis for conflict Resolution Capabilities

Dependent Variable	Predictor Variables	B	Std. $\beta$	T	R2	F
Conflict Resolution Capabilities	Constant	4.137		21.403	.013	1.179
	Sports Participation	.028	.044	0.580		
	Academic Achievement	.057	.102	1.347		

As shown in Table 3, the results of the regression indicated that the two predictors explained 1.3% of the variance. The analysis showed that both Sports Participation (Std.  $\beta$  = .044, t = .580, ns) and Academic Achievement (Std.  $\beta$  = .102, t = 1.347, ns) did not significantly predict Conflict Resolution Capabilities.

Table 4: Multiple Regression Analysis for Negative Affect

Dependent Variable	Predictor Variables	B	Std. $\beta$	t	R2	F
Negative Affect	Constant	3.197		13.114	.039	3.477*
	Sports Participation	-.125	-.153	-2.042*		
	Academic Achievement	-.076	-.107	-1.429		

\*p<.05

As shown in Table 4, the results of the regression indicated that the two predictors explained 3.9% of the variance. The analysis indicated that Sports Participation significantly predicted Negative Affect (Std.  $\beta$  = -.153, t = -2.042, p<.05). However, Academic Achievement (Std.  $\beta$  = -.107, t = -1.429, ns) did not significantly predict Negative Affect.

Table 5: Multiple Regression Analysis for Predisposition to Violence

Dependent Variable	Predictor Variables	B	Std. $\beta$	t	R2	F
Predisposition to Violence	Constant	2.259		9.158	.006	0.495
	Sports Participation	.053	.065	0.856		
	Academic Achievement	.022	.031	0.408		

As shown in Table 5, the results of the regression indicated that the two predictors explained .06% of the variance. The analysis showed that both Sports Participation (Std.  $\beta$  = .065,  $t$  = .856, ns) and Academic Achievement (Std.  $\beta$  = .031,  $t$  = .408, ns) did not significantly predict Predisposition to Violence.

Table 6: Multiple Regression Analysis for School Adjustment

Dependent Variable	Predictor Variables	B	Std. $\beta$	t	R2	F
School Adjustment	Constant	3.518		20.354	.188	20.005***
	Sports Participation	.168	.266	3.859***		
	Academic Achievement	.172	.314	4.547***		

\*\*\* $p < .001$

As shown in Table 6, the results of the regression indicated that the two predictors explained 18.8% of the variance. The analysis showed that both Sports Participation (Std.  $\beta$  = .266,  $t$  = 3.859,  $p < .001$ ) and Academic Achievement (Std.  $\beta$  = .314,  $t$  = 4.547,  $p < .001$ ) significantly predicted school adjustment.

In summary, for the first hypothesis, the multiple regression revealed that Sports Participation had a significant negative impact on negative affect and a positive significant impact on school adjustment. However, there was no relationship between Sports Participation and the other variables (i.e., conflict resolution capabilities and predisposition to violence). For the second hypothesis, it was found that Academic Achievement had a positive significant impact on school adjustment, while it had no significant impact on the other variables (i.e., conflict resolution capabilities, negative affect, and predisposition to violence).

## V. DISCUSSION

The main purpose of this study was to examine the effects of sports participation on the psychological factors of high school students in South Korea. The results showed that sports participation had a negative impact on negative affect. This means that greater sports participation was associated with less negative affect. This outcome supports previous research findings that sports participation by high school students has a positive effect. It is natural that sport activities in adolescence may contribute to emotional stability through enrichment. Additionally, because sports participation in the present study included both direct and indirect involvement in sports, the findings imply that even activities such as watching and talking about sports can positively influence the affective health of high school students who experience various problems in South Korea (e.g., excessive pressure regarding academic achievement).

The current study also explored whether sports participation had a positive impact on school adjustment. The result supported the key statements of previous sports participation studies concerned with adaptation to school life.

Given that one of sport's major ingredients is communication and that sports participation could improve some social skills, the findings of the current study suggest that exposure to sports may enhance the ability to communicate with classmates and teachers, thereby helping students' school adjustment.

Meanwhile, this study also identified the influence of academic achievement on school adjustment. The result might be associated with the natural features of the South Korean education system, which considers the academic achievement of students as a school's main priority. Thus, it is suggested that students should strive for academic effort, in order to become successful and improve their adaptation to school life in South Korea. Finally, academic achievement and sports participation must be encouraged equally because both may function as key factors in improving school adjustment among high school students.

## VI. RECOMMENDATIONS OF FUTURE RESEARCH

Empirical evidence indicates that any sports participation is of benefit to young people<sup>5</sup>. This finding is supported in the current study. Based on these findings, future research should attempt a more comprehensive analysis to explore the underlying impact of sport participation across all generations in different environments, to facilitate a better understanding of sports participation differences across generations. For example, the sport participation study based on a comparative perspective could use cross-cultural or cross-national analyses (i.e., participation in different types of sports in different cultural areas). Another future study would have to determine whether participation in non-traditional sports or even electronic sports is positively linked to aspects of emotional and behavioral well-being.

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## The Effects of Movie-based Learning Project on Students' English Learning Motivation

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### Abstract---

**Background/Objectives:** Due to the difference in language systems between Korean and English, students in an EFL environment may have difficulties understanding Native English speakers. The purpose of this study aims to explore the effects of a movie-based learning project on students' English learning motivation. Also, this study examines students' affective factors that can help students' communication abilities.

**Methods/Statistical analysis:** During the spring semester of 2016, a survey sample of 32 students was chosen for the study. All participants took part in a movie-based learning project and were grouped to complete the project cooperatively during the class. These 32 students were enrolled in advanced practical English as a three-hour credit elective. A paired-sample t test was used in order to compare the results of the two motivation questionnaires. Also, the Pearson correlation coefficient was used within groups to investigate the relationship among participants' self-efficacy, English learning motivation, and grade obtained as a result of doing the movie-based learning project.

**Findings:** According to the research findings and results of the present study, a movie-based learning project can be integrated into the curriculum to facilitate students' motivation in English learning. With regards to students' self-efficacy, students with different self-efficacy levels obtained different grades in the movie-based learning project. The results of this study support the notion that movie-based learning has advantages for students' English learning motivation and cooperative learning.

**Improvements/Applications:** Future research is suggested in order to explore the effects of a movie-based learning project on students' motivation and how it varies depending on the age of the learner. Further studies may show to what degree a movie-based learning project can be considered as an appropriate activity to enhance students' motivation in English learning.

**Keywords---** Movie-Based Learning Project, Students' Affective Factors, English Learning Motivation, Students' Self Efficacy, Cooperative Learning.

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## I. INTRODUCTION

As the society we are living in is called a global community, the cultural, informational, and knowledge-based exchange processes are more active than ever, and the correlation between countries is increasing in strength. Because of this globalization, the ability to communicate in English has become even more important. Therefore, it is imperative that English classes emphasize communication skills. To achieve this, there should be more opportunities to communicate in English. However, opportunities to communicate in English are not common. Using only textbooks, it is really difficult to be exposed to and learn authentic, practical expressions. Research supports the idea that learning sentence structures without context is not very helpful in developing students' practical communicative ability<sup>1</sup>. Class materials are crucial, because they are the only means by which students can gain exposure to an English environment<sup>2</sup>. In this sense, a movie-based learning project is a possible way to compensate for this lack of context. Communicative teaching methods with authentic materials can help students' communicative ability<sup>3</sup>.

With the evolution of technology and computers in this century, digital media are common in our daily life. As time goes by, digital media are widely used for educational purposes. A great number of studies are beginning to investigate how digital media can help as tools for language learning. The role of digital media technology in English learning has been important, as it can play a valuable role in assimilating language and culture education, and give authentic materials to students in an EFL environment<sup>4</sup>.

The purpose of this study is to find methods of successful communication through a movie-based English project which helps students overcome their language difficulties and increase their motivation. Also, this study examines learners' affective factors which can assist students in improving their communication abilities.

Movie-based materials for English classes have already been previously designed by other experts. Communicative language teaching (CLT) is the basis of using movie-based materials. The goal of learning English is to communicate in English. "The goal of CLT should not be understanding language structures, but using language for communication"<sup>5</sup>. Also, CLT focuses on teaching methods that emphasize the development of students' communicative competence<sup>6</sup>.

In the case of class activities, they should be student-centered rather than teacher-centered. That is, teachers should prepare various activities and give motivation for students to participate actively. Teachers' roles in communicative language learning are that of helpers and facilitators. In the EFL environment, most teachers choose ready-made materials for their classes and therefore selecting proper materials is very important. Thus, teaching English using movies is widespread and very effective<sup>7</sup>.

Several previous studies showed the advantages of using movies in English learning. First, it can motivate students to participate in their class activities<sup>3</sup> and students may even enjoy learning English. Second, movies can offer authentic English<sup>8</sup> and real discourse situations. Dialogues in English textbooks are mostly written to focus on grammar and language concepts<sup>8</sup>. It is difficult for students to keep themselves motivated with such dialogues. Third, movies can offer useful expressions, both verbal and nonverbal. Students have a chance to learn how to create their own expressions based on the fixed ones<sup>9</sup>. Fourth, students can learn about different cultures in different countries from movies by observing manners of speech and proper speech acts<sup>10</sup>. Finally, movies can offer strong audio-visual effects to the students. Kwon supported this, saying "Students can make use of language more easily with audio-visual aids"<sup>11</sup>.

According to previous studies, movies are effective class materials to improve and develop students' communication skills. They keep students motivated, offer authentic useful verbal and nonverbal expressions including cultural awareness, and provide powerful audio-visual effects.

Most importantly, movies can offer motivation. In today's classroom, motivation plays a key role in learning. There are two types of motivation: instrumental and integrative motivation. Instrumental motivation is related to practical personal goals, such as good scores on a test, passing exams, having a job, and so on. However, integrated motivation is to assimilate into other cultures and display an interest in learning other languages. Therefore, integrated motivation has a tremendous influence in learning English. Without any motivation, learning English is impossible, even with great teachers, great curricula, and any other great tools or environments. According to Dörnyei, motivation is the basic power for students to learn a language<sup>12</sup>.

Also, motivation is an unconscious element to encourage students in successful language learning<sup>13</sup>. Motivation usually comes from a combination of students' needs and goals to achieve<sup>14</sup>. In other word, it relies on expectation and the value of the goals. In this sense, it is more accurately termed 'efficacy'<sup>15</sup>. Efficacy represents students' expectations for their goals. Self-efficacy is important and cannot be ignored because it strongly affects students' efforts<sup>15</sup>.

A movie-based learning project makes it possible for students to share the same goal with their group members and develop a sense of personal responsibility for their role in achieving that goal, thus naturally increasing their motivation.

## **II. METHOD**

### **A. Subjects**

The subjects of this study were 32 students from a university in Korea. These students took the course of Advanced Practical English as an elective in the form of a three-hour credit course. The students had many opinions and ideas for the cooperative projects, but it was very difficult for them to proceed, organize, manage, their projects.

Students were told about the projects and English presentations and that there would be questionnaires to be completed for the research.

### **B. Procedure**

Before the project, the questionnaires regarding motivation towards English learning were completed. Afterwards, the class design of the movie-based learning project, procedure, and teaching methods including cooperative activities and presentations were explained. During their activities students could contact their teacher by e-mail and text message whenever they had questions, problems, and any other concerns.

On the presentation day of the movie-based learning project, students made their presentations and were asked to do a feedback worksheet for peer feedback and corrections. After the presentation, students could express their opinions and discuss them freely with their group members first. At the end of the class the student leaders of each group gave feedback and comments.

Students also answered the motivation questionnaires. Once all students answered the questionnaires, the movie-based learning project was concluded.

### **C. Instrument**

In this study, a survey in the form of a questionnaire was made to find out students' motivation in English learning. These English learning motivation questionnaires were adapted<sup>14</sup> and were designed to investigate the differences between student participation before and after their activities. As well, there was another questionnaire focused on self-efficacy investigation. To find out the relationship between English learning motivation and self-efficacy, the data were analyzed by SPSS to obtain the Cronbach's alpha value that showed a high level of internal consistency.

### **D. Data Collection and Analysis**

In this study, data were collected from the questionnaires. One questionnaire was done before the movie-based learning project, and the other one was done after the experiment of the movie-based learning project.

A paired t test was used to compare the two motivation questionnaires, and the Pearson correlation coefficient was used within groups to investigate the relationship between participants' self-efficacy and English learning motivation during the movie-based learning project.

## **III. RESULTS**

### **A. English Learning Motivation**

The students' English learning motivation was different after the experiment of the movie-based learning project.

This was evident from the test results, which showed that the mean of pre-English learning motivation was lower than that of post-English learning motivation.

Table 1: English Learning Motivation

English learning Motivation	Mean	SD	N	df	P
Pre	98.34	8.01	32		
				92	-4.041
Post	104.00	8.34	32		

\*p<.05

Table 1 shows that the significant difference between pre- and post-English learning motivation questionnaires as (t(92)=-4.041, p=.000<.05). The result of the students' English motivation indicated that the movie-based learning project surely affected students' English motivation.

**B. Self-Efficacy**

Table 2 shows the result of students' self-efficacy. The mean of students' self-efficacy is 42.77, which can influence students' decisions as the amount of learning efforts.

Table 2: Self-Efficacy

The average of Students' Self-efficacy	SD	N
42.77	8.66	32

**C. Correlation between Students' English Learning Motivation and Self-Efficacy**

Table 3 shows that the presence of a correlation between the results of post -English learning motivation and self-efficacy.

Table 3: Correlation between English Learning Motivation and Self-efficacy

	Mean	SD	N	Pearsonr
English learning Motivation	104.008.34		32	
				.305*
Self- efficacy	42.77	8.66	32	

As table 3 shows, the students' post English learning motivation was associated with their self-efficacy significantly as Pearson r=.305(.003<.05).

This result demonstrated the same result of the research that self-efficacy is closely connected to learning motivation <sup>15</sup>.

**D. Students' perception of the Movie-Based Learning Project**

Table 4: Students' Perception on Movie Based Learning Project

Students' perception	Strongly agree (%)	Agree (%)	Neutral (%)	Strongly disagree (%)	disagree (%)
Learn lots of voc. usages	44	34	2	0	
Active learning	14	50	23	13	0
Cooperative	31	32	20	7	0
More interesting subject	15	40	30	15	0
Participation	18	50	17	15	0
Self esteem	13	53	32	5	0
Peer feedback	20	60	18	2	0

% of total number 32

Table 4 shows the results of the students' perceptions of the movie-based learning project. According to the study, students learned many vocabulary words and concepts of language usage as a result of the movie-based learning project. Students wanted to learn English actively as over 60 % students of the total 32 agreed. In the case of cooperative learning, over 70 % students of total 32 agreed. After the movie based- learning project, students agreed that English was more interesting than other courses or subjects. Also, the result of self-esteem shows that 13 % of the total 32 students strongly agreed and 53 % of total 32 students agreed.

Students are happy to give peer feedback after the presentation as 20% students of the total 32 strongly agreed, and 60 % students of the total 32 agreed. Finally, this study shows that a movie- based learning project helps students become motivated and enhances their cooperation and participation.

#### IV. DISCUSSION

The result of this study makes a good case for incorporating a movie- based learning project in EFL classes. First of all, a movie- based learning project facilitates students' English learning motivation. This study found that students' English learning motivation is strongly connected with students' self- efficacy, which lets students make decisions regarding the amount of effort they put into participating in classes.

A movie- based learning project is a good method for getting students to engage in cooperative learning during class hours and increasing the relationship among students while doing group work. Every student was asked to complete a feedback worksheet to do peer feedback and corrections. According to the interviews done with students, peer feedback helped decrease their anxiety about making mistakes, but increased their self-esteem. Also, after the presentation, students could express their opinions and discuss their ideas freely with their group members. Initially and at the end of the class, the student leaders of each group gave feedback and comments to help trigger the learning motivation of their group. According to the result of students' perceptions on the movie- based learning project, over 80 % of the total 32 students enjoyed peer feedback.

In conclusion, a movie-based learning project has clear advantages for students' English learning motivation and self-efficacy because it reduces their anxiety about making errors, and it increases cooperative learning. English is a core issue for many students around the world, and a movie- based learning project is one appropriate learning method which can be utilized to enhance communicative learning.

The present study is somewhat limited in its generalization. First, the number of subjects should be expanded. The sample size of 32 students is insufficient for conclusive results. Therefore, further research could include a more varied and larger sample size of students and research environments.

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# A Survey of Dental Hygienists' Perception on Self-Development Practice and Motivation for Job Competency Enhancement

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## Abstract---

**Objectives:** The aim of this study was to investigate the relationship between self-development practice and job competency enhancement, current status and limitations of self-development activities and types of motivations that stimulate self-development.

**Methods/Statistical analysis:** 266 dental hygienists were recruited via convenience sampling method. The questionnaire consisted of 55 questions regarding the nature and frequencies of self-development activities, their perception on self-development and job competency enhancement, types of motivation toward self-development.

**Findings:** While 53.8% of the subjects answered they are currently involved in self-development activities, the most popular activities were exercise, cultural activities and job-related studying as their average scores were  $4.37 \pm 1.67$ ,  $3.62 \pm 1.02$  and  $3.65 \pm 1.33$ , respectively. When subjects' perception on job competency enhancement was analyzed with respect to participation in self-development activities, significant differences were detected in subcategories of job competency enhancement; expansion of their scope of work and improvement of their work environment ( $p < 0.01$ ) and advancement of social status, improvement in self-esteem, improvement in work ethics.

**Improvements/Applications:** Assuring self-development opportunities and creating self-development friendly environment are essential as self-development could enhance individual's job competency and self-efficacy. Boosting dental hygienists' motivation to engaging in self-development activities would lead to their job competency enhancement and this would in turn increase public perception on dental hygienists' professionalism.

**Keywords---** Dental Hygienist, Self-Development, Intrinsic Motivation, Extrinsic Motivation, Job Competency Enhancement.

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## **I. INTRODUCTION**

As socioeconomic and technologic advancements and changes in demographic structures are made as time goes, consumers of various services rapidly change in terms of their sense of rights. This trend is also seen in the field of medicine and of course, advancements and shifts in the field of dentistry are as rapid<sup>1</sup>. Supplies of Services in the field of dentistry have been increased quantitatively and demands for such services have been widely diversified. Due to such changes, the field of dentistry has become a part of ultramodern technologies and therefore, has grown qualitatively. As the value of health increases as the proportion of aged population increases, the significance of roles that dental hygienists play in the health related fields also has been increasingly highlighted<sup>2</sup>. Enhancing job efficiency by advancing dental care professionals' competency is essential for advancing dentistry. Furthermore, policies regarding professional dental hygienists who focus on preventive care, education and management should also be expanded and qualitative advancement in educating and training dental hygienists is also necessary in order to increase the general quality of related services<sup>3</sup>.

Many dental hygienists nowadays show great interest in advancing their education by enrolling in degree completion programs, master's degree and doctoral programs. Setting more clearer significance and perception for self-development seems essential at this point as these individuals' interests in continuing education is often simply due to their interests in acquiring degrees<sup>3</sup>.

Self-development is defined as when individuals actively participate in various activities in order to obtain techniques or knowledge that they require, and studies show that self-development has a positive impact on job competency and work performance which in turn boosts their sense of accomplishment<sup>4</sup>. Therefore, it seems plausible that as professional individuals, dental hygienists could enhance their job competency by engaging in self-development activities.

When different types of motivation toward self-development are put on a continuum, they could be classified as either extrinsic or intrinsic motivation based on degrees of autonomy or self-determination. While intrinsic motivation is defined as when individuals immerse themselves in a behavior because the behavior itself functions as a source of pleasure, extrinsic motivation is defined as when individuals are given external rewards or compensations<sup>5</sup>.

Although there have been numerous studies done on dental hygiene students<sup>6</sup>, a limited number of studies have been conducted on what motivates self-development and how much impact such motivational factors have on individuals that actually practice self-development behaviors or reach job competency enhancement. Furthermore, studies done on subjects in the field of dental hygiene or other related fields demonstrated that many of these subjects think that dental hygiene is somewhat lagging behind other academic fields<sup>7</sup>, which shows that the current status of dental hygiene is relatively low in these individuals' perception.

Therefore, current status and limitations of self-development activities and types of motivations that stimulate self-development and the relationship between self-development practice and job competency enhancement were investigated in this study.

## **II. PROPOSED WORK**

### **A. Study Subjects**

Survey questionnaires were given out to licensed dental hygienists selected via convenience sampling. Data were collected from March 2015 to May 2015 and data from 266 questionnaires were analyzed.

### **B. Survey Questionnaire**

The survey questionnaire was based on the studies<sup>5, 8</sup> and was modified and revised for the purpose of this current study.

The survey questionnaire consisted of 55 questions; nine questions for subject's general characteristics, one question to confirm whether or not the subjects participate in self-development activities, 11 questions for the frequency and details of their self-development activities, seven questions for their perceptions on self-development and job competency enhancement, 11 questions for limitations in self-development activities and 16 questions regarding motivations that stimulate self-development.

### C. Data Analysis

Collected data and information were analyzed utilizing SPSS program version 22.0(SPSS Inc. Chicago. IL. USA). While subjects' general characteristics, whether they are engaging in self-development activities and the nature of such activities were analyzed via frequency analysis, descriptive analysis was utilized to investigate what limits subjects from participating in self-development, types of motivations that stimulate self-development, and their perception on job competency enhancement. ANOVA was done in order to verify the difference in terms of subjects' perception on job competency enhancement with respect to whether they actually engage in self-development.

### III. CONCLUSION

While 53.8% of the subjects answered they are currently involved in self-development activities, the most popular activities were exercise, cultural activities and job-related studying as their average scores were  $4.37 \pm 1.67$ ,  $3.62 \pm 1.02$  and  $3.65 \pm 1.33$ , respectively in Table 1.

Table 1: Self-Development Activities and Their Frequency

Self-development activities		Frequency N(%)						M	SD
		Rarely	Once or twice a year	Once or twice in six months	Once or twice in a month	Once or twice in a week	Almost everyday		
Work-oriented	Studying job related subjects	14(9.8)	14(9.8)	28(19.6)	45(31.5)	36(25.2)	6(4.2)	3.65	1.33
	Studying to acquire certificates	48(33.6)	34(23.8)	26(18.2)	14(9.8)	16(11.2)	5(3.5)	2.52	1.49
	Studying to acquire degrees	73(51.0)	6(4.2)	3(2.1)	6(4.2)	49(34.3)	6(4.2)	2.79	1.96
	Studying computer related subjects	95(66.4)	26(18.2)	9(6.3)	8(5.6)	4(2.8)	1(0.7)	1.62	1.08
	Studying foreign languages	46(32.2)	19(13.3)	8(5.6)	11(7.7)	41(28.7)	18(12.6)	3.25	1.93
Art-oriented	Arts activities	96(67.1)	14(9.8)	13(9.1)	9(6.3)	6(4.2)	5(3.5)	1.81	1.38
	Photography	44(30.8)	6(4.2)	16(11.2)	31(21.7)	39(27.3)	7(4.9)	3.25	1.72
	Cultural activities	10(7.0)	8(5.6)	28(19.6)	77(53.8)	20(14.0)	0(0)	3.62	1.02
Social, Health, and Training-oriented	Hobby clubs and social activities	51(35.7)	16(11.2)	22(15.4)	34(23.8)	19(13.3)	1(0.7)	2.70	1.51
	Exercise	21(14.7)	4(2.8)	6(4.2)	20(14.0)	54(37.8)	38(26.6)	4.37	1.67
	Training	107(74.8)	17(11.9)	13(9.1)	2(1.4)	4(2.8)	0(0)	1.45	0.925

M : Mean, SD : Standard deviation

'Self-development activities of my interest cost too much' was the most frequent response to the question that asked about factors that limit or prevent subjects from actively engaging in self-development activities with an average score of  $3.52 \pm 0.882$ , which was followed by 'I am interested but do not have enough will power to actually participate' ( $3.47 \pm 1.022$ ) and 'I have no time because of my work' ( $3.44 \pm 0.97$ ) in Table 2.

Table 2: Factors that Limit Subjects from Engaging in Self-Development Activities

Factors that limit subjects from engaging in self-development activities	M	SD
I have no time because of my work.	3.44	0.974
I have no time because of my household chores.	2.83	1.074
There are not enough off-duty days for self-development. .	3.35	0.388
Self-development activities of my interest cost too much.	3.52	0.882
My mind has no spare capacity (I am too stressed).	3.32	0.984
I am interested but do not have enough will power to actually participate.	3.47	1.022
I don't feel the need.	2.32	0.885
I have no colleagues or friends to do such activities with.	2.06	0.816
People around me would not approve me engaging in such activities.	1.87	0.782
Facilities or locations that offer such activities are severely limited.	2.96	1.011
Information on self-development activities is severely limited.	3.00	1.002

Likert scale (Ranging from 'strongly disagree' = 1point to 'Strongly agree' =5points)

M : Mean, SD : Standard deviation

Results from the question regarding the types of motivations that stimulate study subjects to engage in self-development activities are organized in Table 3. While 'I enjoy learning something that I did not know,' a sub-domain of 'intrinsic motivation' showed the highest score with an average of 3.87±0.802, 'intrinsic motivation' which encompasses higher self-determination was scored higher than 'external control motivation' which is categorized as 'extrinsic motivation,' 'internal control motivation,' and 'identification control motivation'.

Table 3: Types of Motivations that Stimulate Self-Development

Types of motivations that stimulate self-development		M	SD
External Control Motivation	Working at an ideal work place with enough salary seems quite challenging given my current status.	2.93	0.969
	I hope to obtain a better job or position in the future.	3.36	0.997
	I want a more secure life for myself in the future.	3.59	0.940
	I would like to increase my salary/wage.	3.38	0.996
Internal Control Motivation	I would like to show what a competent professional I am.	3.27	0.958
	I would like to prove that I can succeed in life with my career.	3.32	0.968
	I would like prove it on my own that I can perform my tasks better than now.	3.54	0.920
	I believe that my successful career would make me an important person.	3.38	0.949
Identification Control Motivation	Self-development activities give me an opportunity to better prepare myself for my career.	3.54	0.903
	Self-development activities would ultimately bring me success within the field of my interest.	3.55	0.951
	Self-development activities would guide me to make better choices in terms of my future career.	3.66	0.841
	I believe that self-development activities would enhance my work-related performance or capability.	3.70	0.842
Intrinsic Motivation	Learning new things can be rewarding on their own as they give me pleasure and satisfaction.	3.86	0.798
	I enjoy learning something that I did not know before.	3.87	0.802
	I enjoy learning or getting to know something that I am interested in.	3.86	0.783
	I can continuously learn or obtain new things in the area of my interest.	3.86	0.799

Likert scale (Ranging from 'strongly disagree' = 1point to 'Strongly agree' =5points)

M : Mean, SD : Standard deviation

'When subjects' perception on job competency enhancement was analyzed with respect to participation in self-development activities, significant differences were detected in subcategories of job competency enhancement; expansion of their scope of work and improvement of their work environment(p<0.01) and advancement of social status, improvement in self-esteem, improvement in work ethics are shown in Table 4.

Table 4: Verification on Difference in Subjects' Perception on Job Competency Enhancement with Respect to Participation in Self-Development Activities

Perception on job competency enhancement	Participation in self-development activities	M	SD	P
Expanding scope of work	Currently participating	3.86	0.737	0.000**
	Not participating	3.18	1.049	
	Will participate later	3.56	0.980	
	total	3.64	0.915	
Improving work environment	Currently participating	3.65	0.771	0.006**
	Not participating	3.25	0.876	
	Will participate later	3.38	1.054	
	total	3.50	0.883	
Advancing social status	Currently participating	3.66	0.796	0.028*
	Not participating	3.35	0.917	
	Will participate later	3.41	0.944	
	total	3.53	0.869	
Advancing professional image	Currently participating	3.83	0.760	0.053
	Not participating	3.62	0.825	
	Will participate later	3.57	0.875	
	total	3.72	0.809	
Increasing self-esteem	Currently participating	3.76	0.822	0.033*
	Not participating	3.45	0.872	
	Will participate later	3.51	1.014	
	total	3.63	0.890	
Improving work ethics	Currently participating	3.75	0.818	0.024*
	Not participating	3.45	0.832	
	Will participate later	3.46	0.997	
	total	3.61	0.875	
Strengthening group solidarity	Currently participating	3.42	0.834	0.231
	Not participating	3.22	0.846	
	Will participate later	3.25	0.999	
	total	3.33	0.880	

Likert scale (Ranging from 'strongly disagree' = 1point to 'Strongly agree' =5points)

M : Mean, SD : Standard deviation, \*p < 0.01 \*P < 0.05

53.8% of all participants answered that they are 'currently engaging in self-development activities' which showed an increase compared to the study conducted by Yoo<sup>1</sup> in which only 42.3% of the participants answered so. In addition, subjects who revealed that they are currently engaging in self-development activities also identified the nature of their activities as 'work-related study' and 'learning foreign languages' with mean scores of  $2.46 \pm 1.268$  and  $1.72 \pm 1.211$ , respectively. Compared to the results from previous study<sup>7</sup>, this result of the current study demonstrates that over the last three years dental hygienists' actual participation in various self-development activities has increased. In terms of the types of motivations for self-development, 'I enjoy learning something that I did not know,' a sub-domain of 'intrinsic motivation' showed the highest score with an average of  $3.87 \pm 0.802$ . In other words, the strongest motivation was shown to arise from 'intrinsic motivation,' which was similar to the result from previous study<sup>9</sup> in which intrinsic job satisfaction was observed to be greater than extrinsic job satisfaction<sup>10</sup>. Therefore, assuring self-development opportunities and creating self-development friendly environment are essential<sup>11</sup> as self-development could enhance individual's job competency and self-efficacy. Boosting dental hygienists' motivation to engaging in self-development activities would lead to their job competency enhancement and this would in turn increase public perception on dental hygienists' professionalism.

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# The Effects of Corporate Family-Friendly Policies upon Married Women's Job Satisfaction and Turnover Intention

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## Abstract---

**Background/Objectives:** This study was conducted to contribute to activating corporate family-friendly policies by identifying the effects of corporate family-friendly policies upon married women's job satisfaction and turnover intention.

**Methods/Statistical analysis:** The participants of this study were married women working at enterprises and organizations located in Korea, and the questionnaire survey was conducted between September and November 2015. This study collected a total of 211 questionnaires and excluded 10 questionnaires with missing values or improper responding to analyze a total of 201 questionnaires. We analyzed data through One-way ANOVA, Pearson's correlation coefficients, and mediation regression analysis using SPSS 22.0 statistical program.

**Findings:** From the results of the study, research participants' job satisfaction showed a positive correlation with flexible working hours ( $r=.157$ ), childbirth, parenting and education support programs ( $r=.272$ ), employee support programs ( $r=.226$ ) and family-friendly culture fostering ( $r=.244$ ), and their turnover intention showed a negative correlation with dependent family support system ( $r=-.146$ ), employee support programs ( $r=-.264$ ), family-friendly culture fostering ( $r=-.140$ ). In addition, married professional women's turnover intention was found to affect the family friendliness index with a mediator of job satisfaction, and its explanatory power was 15.1%.

**Improvements/Applications:** it is necessary to actively introduce and utilize childbirth and parenting related support systems, workplace counseling programs to talk about these matters, and long-term and efficient national support policies.

**Keywords---** Family Friendliness Index (FFI), Job Satisfaction, Turnover Intention.

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## I. INTRODUCTION

As the expanded social participation of women, one of the major changes relating to the labor market of the world is the constant increase in female labor force participation rate and accordingly the increase in the proportion of female employment. Female labor force participation rates in OECD member countries such as the United States and the United Kingdom have a tendency to increase year by year<sup>1</sup>, and in the case of Korea also show a constant rise from 41.9% in 2006 to 53.1% in 2011 and 55.7% in 2015<sup>2</sup>.

Most enterprises think of the organization members as a key resource directly affecting corporate performance, and spend a lot of expenses and efforts to manage them<sup>3</sup>, but in the case of married working women, as they are primarily responsible for housework and childcare at home other than the work in the workplace, the conflict between workplace and home due to the double burden of work affects turnover intention<sup>4,5</sup>. The employee turnover drops the morale of the organization, lowers the efficiency, and also has a negative effect on the productivity of the organization<sup>6</sup>. Therefore, in modern society where the entry of women in public affairs gets active and dual-careers go on increasing, as compatibility of work and family has become an important issue which comes with raising the importance of family-friendly social environment to harmoniously balance work and family life, many countries introduce and implement family-friendly policies these days. In advanced country such as the United States and Europe since the 1980s, while experiencing the increase of the entry of women in public affairs, changes in family structure, and changes of men and women workers' consciousness, the family-friendly system was a system being introduced as a consideration for the workers' housework sharing responsibility<sup>7</sup>, and generally refers to diverse systems to be provided in an enterprise dimension to support harmoniously paralleling works of men and women workers' career and family. That is, it can be a supporting system to harmonize employees' needs in the workplace and their needs as parents including flexible working hours, child birth and parenting support programs, children's education support system, dependent family support programs, employee support programs, family-friendly culture, etc., and so therefore, a family-friendly enterprise means a firm that actively supports some or all of these family-friendly policies. According to previous studies a significant number of enterprises that introduced these family-friendly systems reported that corporate culture had a positive effect upon employees' organizational commitment, career life satisfaction, turnover intention, family life satisfaction and work performance, etc.<sup>7-12</sup>, but it is said that the level of actively introducing family-friendly policies to Korea is still inadequate, and that one of the reasons is the lack of confidence in the effect of family-friendly system.

In<sup>13</sup> reported that in the case of women other than men, the conflict between workplace and households had negative effects on job satisfaction and that family support and business flexibility by supervisors enhanced job satisfaction. Married women's conflict between workplace and family life decreased job satisfaction and productivity, and eventually increased turnover intention, exerting a negative effect<sup>14, 15</sup>, which in a national dimension might bring about a serious social problem of decreasing fertility causing women to evade marriage and childbirth as a way of coping with the conflict between women's family lives and their workplace lives<sup>7</sup>. Thus, this study attempts to contribute to activating a family-friendly enterprise system and decreasing turnover intention by analyzing effects of a family-friendly enterprise system upon married women's job satisfaction and turnover intention.

## II. RESEARCH METHOD

### A. Research Design

This study is a descriptive correlational study to analyze the effects of corporate family-friendly policies on the job satisfaction and the turnover intention of women workers in Korea.

### B. Survey Participants and Data Collection Method

Participants of this study were married women working at enterprises and organizations located in Cregion, Korea, and data were collected between September and November 2015. G\*Power 3.1. Program was used to get a sample size for this study, the required sample size was 138 with the significant level ( $\alpha$ ) 0.05, power of test ( $1-\beta$ ) 0.95, effect size ( $p$ ) 0.3, and the number of predictors 5. In considering the dropout rate, out of a total of 250 questionnaires distributed, 211 questionnaires were collected, and except for the 10 questionnaire that had missing values and were responded improperly, a total of 201 questionnaires were used for the data analysis of this study.

### **C. Measurements**

#### **Family Friendliness Index**

As for the family-friendly, this study employed the questionnaire developed in 2006 and modified in 2009 by Korea Ministry of Gender Equality and Family<sup>16</sup> by modifying and supplementing it to suit the purpose of the present study. Family friendliness index consists of primary indicators and secondary indicators of five areas (flexible working hours, childbirth, parenting and education support system, dependent family support programs, employee support programs, family-friendly culture fostering), and is calculated through applying the weighted cores in sectors by adding secondary indicator scores entailing the character of program with the voluntary nature to primary indicator scores belonging to the legal area. Based on the calculated scores, as for family-friendly steps, the case with primary indicators higher than 80 points and secondary indicators higher than 60 points is classified to be very excellent, the case with primary indicators 60-79 points or higher and secondary indicators of 30 points or higher is to be excellent, the case with primary indicators 30-59 points and secondary indicators 10 points or higher is to be good, the case with primary indicators 20-39 points is to be basic, and the case with primary indicators 20 points or less is classified to be poor.

#### **Job Satisfaction**

As for job satisfaction, this study employed the scale developed by<sup>17</sup> to measure emotional satisfaction, tenure satisfaction and normative satisfaction and used it by modifying and supplementing seven questionnaires to measure emotional satisfaction to meet the purpose of this study. The tool consists of 5 level Likert scale (1 point strongly disagree - 5 points strongly agree), and means that the higher the score is, the higher the job satisfaction is. The total score ranges between 7-35, and Cronbach's alpha for job satisfaction in this study was 0.81.

#### **Turnover Intention**

As for turnover intention, this study used the tool developed by<sup>18</sup> and modified and supplemented to match the characteristics of Korea. This tool consists of 4 items with 5 level scale (1 point strongly disagree - 5 points strongly agree), and a higher score means a higher degree of turnover intention. The total score range of this tool was between 4-20, and Cronbach's alpha for turnover intention in this study was 0.85.

### **D. Data Analyses**

This study used SPSS Win 22.0 for statistical analysis of the data, and conducted descriptive statistics for the general characteristics, the family friendliness index, job satisfaction and turnover intention. For difference analysis of variables according to the general characteristics, this study used t-test and one-way ANOVA, conducted post-analysis with Scheffe test, and analyzed the relation between variables with Pearson correlation coefficients. This study used mediation regression to analyze effects of family friendliness index and job satisfaction on turnover intention.

### **E. Ethical Considerations**

Prior to data collection, this study considered the ethical aspects by providing participants with the purpose and method of research, utilization of research results, survey data to be used only for the study purpose, anonymity and confidentiality of research participants, and a description of stopping during the creation of the questionnaire, and by receiving the consent from participants. It took 10 to 15 minutes to complete the survey questionnaire items, and after the questionnaire items were fulfilled, a predetermined gift was provided for participants.

### **F. Limitations**

As participants in this study were collected with convenience sampling on a target of married women in a city, Korea, it is said that there may be a limitation to generalize the results of this study to all other married women.

## **III. RESULTS**

### **A. Demographic Background of Participants**

The demographic background of the research participants can be explored in Table 1. The average age of married women is 39.37 years old, and the age distribution is most common with 101 (50.2%) participants in their 40s.

In terms of the classification of jobs, service employees were most common in 76 participants (37.8%), followed by manufacturing employees in 75 participants (37.3%). As for education levels, Education and Vocational Education Graduates of the most common, less than four-year university graduates were most common in 86 participants (42.8%), and high school graduates and two-year college graduates were respectively 39 participants (19.4%).

The case with two children or more comprised 121 participants (61.2%) and the case with one child comprised 50 participants (24.9%). As for working career, there were 10-15 years for 61 participants (30.3%), 2-5 years for 46 participants (22.9%), less than 2 years for 34 participants (16.9%), and 5-10 years for 33 participants (16.4%) in that order.

Professional women working at enterprises in a size of more than 300 employees were most common in 98 participants (48.8%), followed by 10-49 employees in 39 participants (19.4%), and 50-99 employees in 23 participants (11.4%) in order. The case of over 60 million won annual salary comprised 48 participants (23.9%), followed by 20 million won or below comprised 38 participants (18.9%). In terms of family-friendly stages for the enterprises that participants worked for, there were 92 (45.8%) at a good stage, 49 (24.4%) at a basic stage, 44 (21.9%) at a poor stage, and 16 (8.0%) at an excellent stage.

Table 1: Demographic Background

(N=201)

Characteristics	Categories	n(%), M±SD
Age(year)	Average	39.37±6.68
	20-29	19(9.5)
	30-39	71(35.3)
	40-49	101(50.2)
	≥50	10(5.0)
Occupation	Manufacturing industry	75(37.3)
	Public sector	30(14.9)
	Service industry	76(37.8)
	Other type of businesses	20(10.0)
Education level	≤High school graduation	39(19.4)
	College graduation	39(19.4)
	University graduation	86(42.8)
	≥Master's course	35(17.4)
Number of children	None	30(14.9)
	One	50(24.9)
	≥two	121(61.2)
Working career(year)	≤2	34(16.9)
	2-5	46(22.9)
	5-10	33(16.4)
	10-15	61(30.3)
	15-20	20(10.0)
	≥20	7(3.5)
Size of company(personnel)	1-4	11(5.5)
	5-9	14(7.0)
	10-49	39(19.4)
	50-99	23(11.4)
	100-299	16(8.0)
	≥300	98(48.8)
Annual Income(million)	≤20	38(18.9)
	21-30	23(11.4)
	31-40	43(21.4)
	41-50	32(15.9)
	51-60	17(8.5)
	≥60	48(23.9)
FFI Level	High	16(8.0)
	Good	92(45.8)
	Basic	49(24.4)
	Insufficiency	44(21.9)

### B. Descriptive Statistics for Variables

The family friendliness index, job satisfaction and turnover intention for workplaces that the participants of the study worked for can be referred to Table 2.

Family friendliness index appeared to be between 51.44±29.54 points in the range of 0-125 points, job satisfaction to be between 23.91±3.85 points in the range of 7-35 points, and turnover intention to be between 10.93 ± 3.36 points in the range of 4-20 points.

Table 2: Descriptive Statistics for Variables

(N=201)

Variables	Range	M±SD	Min	Max
Family-friendliness index	0-125	51.44±29.54	1.89	114.48
Job satisfaction	7-35	23.91±3.85	11.00	33.00
Turnover intention	4-20	10.93±3.36	4.00	20.00

### C. Difference Analysis of Family Friendliness Index (FFI), Job Satisfaction, and Turnover Intention According to Demographic Background

As shown in Table 3, there are the results of analyzing the participants' socio-demographic background and their accompanying family friendliness index, job satisfaction, the difference between turnover intentions. First, to explore the family friendliness index, professional married women's family friendliness index was shown to be different according to job classifications ( $F=11.617$ ,  $p<.001$ ), work experience ( $F=4.285$ ,  $p=.001$ ), enterprise size ( $F=15.543$ ,  $p<.001$ ), annual salary ( $F=10.682$ ,  $p<.001$ ), family-friendly stages ( $F=476.824$ ,  $p<.001$ ), their job satisfaction was shown to have a statistically significant difference according to age ( $F=6.626$ ,  $p<.001$ ), number of children ( $F=6.900$ ,  $p=.001$ ), workplace size ( $F=5.645$ ,  $p<.001$ ), annual salary ( $F=2.804$ ,  $p=.018$ ), family-friendly stages ( $F=6.044$ ,  $p=0.001$ ), and their turnover intention was shown to have a statistically significant difference according to the education level ( $F=2.895$ ,  $p=.036$ ), number of children ( $F=5.837$ ,  $p=.003$ ), enterprise size ( $F=2.685$ ,  $p=.023$ ), annual salary ( $F=2.875$ ,  $p=.016$ ), family-friendly stages ( $F=19.082$ ,  $P<.001$ ).

In other words, as for the family-friendliness index at a workplace that research participants experienced, that of the manufacturing industry and public authorities was shown to be higher than that of service sector workplaces and other occupations, the case of career experiences of 10 to 20 years was shown to be higher than that of career experience of less than two years, and as for the enterprise size, the family-friendliness index at enterprises with 300 employees or more was shown to be the highest. Job satisfaction of research participants in their 20s was shown to be the lowest, and that of married women with no children was shown to be lower than that of married women with children. In the size of workplaces, job satisfaction of married women who worked at workplaces with 100-299 employees was shown to be the lowest, and job satisfaction of employees with annual salary of 21-30 million won was shown to be the lowest. In case that the family-friendly stage was excellent, job satisfaction was shown to be higher than that of good, basic and poor stages.

In turnover intention of professional married women, turnover intention of graduates with 3 and 4-year college education were shown to be higher than that of graduates with graduate school education, in case of professional married women with a child there was a higher turnover intention than in case with no children or more than two children. In the size of enterprises, turnover intention in the workplace with 5-9 employees was shown to be higher than that of workplaces with 1-4 employees and workplaces with more than 300 employees, turnover intention in case of annual salary of 21-40 million won was shown to be higher than in case of annual salary of 60 million won, and turnover intention in case of an excellent family-friendly stage was shown to be statistically lower than in cases of good, basic and poor family-friendly stages.

Table 3: Family Friendliness Index(FFI), Job Satisfaction, Turnover Intention According to Demographic Background

Background	Categories	FFI		Job satisfaction		Turnover intention	
		M±SD	F(p)/scheffe	M±SD	F(p)/scheffe	M±SD	F(p)/scheffe
Age(year)	20-29 <sup>a</sup>	48.65±36.34	1.747 (.159)	20.37±4.45	6.626 (<.001)* b, c, d> a	10.79±4.49	1.306 (.274)
	30-39 <sup>b</sup>	54.93±30.41		24.55±3.50		10.37±3.19	
	40-49 <sup>c</sup>	51.56±27.96		24.09±3.59		11.38±3.12	
	≥50 <sup>d</sup>	32.55±20.14		24.20±4.52		10.60±4.38	
Occupation	Manufacturing industry <sup>a</sup>	57.88±27.58	11.617 (<.001)* a, b > c > d	23.44±3.90	2.024 (.112)	10.85±3.06	2.469 (.063)
	Public sector <sup>b</sup>	69.83±28.48		23.43±2.85		9.53±2.47	
	Service industry <sup>c</sup>	43.68±26.64		24.75±3.84		11.45±3.73	
	Other type of businesses <sup>d</sup>	30.80±27.92		23.15±4.61		11.30±3.76	
Education level	≤High school graduation <sup>a</sup>	46.43±31.84	0.522 (.668)	23.85±3.91	1.185 (.317)	10.31±3.37	2.895 (.036)** b, c>d
	College graduation <sup>b</sup>	50.86±35.18		24.77±3.60		11.33±2.97	
	University graduation <sup>c</sup>	53.75±26.39		23.94±3.41		11.48±3.68	
	≥Master's course <sup>d</sup>	52.10±29.39		23.09±4.94		9.74±2.69	
Number of children	None <sup>a</sup>	55.32±36.06	0.308 (.735)	21.57±4.18	6.900 (.001)* b, c>a	10.80±3.87	5.837 (.003)* b > a, c
	One <sup>b</sup>	51.03±32.95		24.34±3.83		12.28±3.91	
	≥two <sup>c</sup>	50.61±26.17		24.31±3.59		10.40±2.82	
Working career (year)	≤2 <sup>a</sup>	40.67±28.74	4.285 (.001)* d, e > a	23.03±3.50	1.873 (.101)	11.41±3.24	1.791 (.116)
	2-5 <sup>b</sup>	43.25±26.94		24.70±4.26		11.15±4.45	
	5-10 <sup>c</sup>	49.76±30.80		22.55±3.48		11.06±2.93	
	10-15 <sup>d</sup>	60.58±30.35		24.23±3.62		11.18±2.87	
	15-20 <sup>e</sup>	68.04±23.14		24.50±4.65		9.00±2.90	
	≥20 <sup>f</sup>	42.40±9.07		24.86±1.95		9.71±0.49	
Size of company (personnel)	1-4 <sup>a</sup>	13.63±6.22	15.543 (<.001)* f > b,c,d,e> a	24.91±4.78	5.645 (<.001)* a, c, f> e	10.45±2.42	2.685 (.023)** b > a, f
	5-9 <sup>b</sup>	31.95±26.58		23.64±4.27		12.86±3.23	
	10-49 <sup>c</sup>	40.71±22.63		25.00±3.74		11.97±4.52	
	50-99 <sup>d</sup>	46.40±22.77		22.09±3.78		11.17±3.75	
	100-299 <sup>e</sup>	39.13±25.45		20.25±3.44		10.88±2.45	
	≥300 <sup>f</sup>	66.28±27.61		24.42±3.36		10.23±3.36	
Annual Income (million)	≤20 <sup>a</sup>	47.56±28.30	10.682 (<.001)* c, f > a > b	24.21±3.53	2.804 (.018)** f > b	10.47±3.38	2.875 (.016)** b, c > f
	21-30 <sup>b</sup>	28.24±16.49		21.48±5.15		11.70±3.42	
	31-40 <sup>c</sup>	61.50±30.29		23.58±3.28		11.00±2.84	
	41-50 <sup>d</sup>	42.63±25.91		24.47±3.62		12.34±4.05	
	51-60 <sup>e</sup>	35.09±17.23		23.59±4.57		11.35±4.01	
	≥60 <sup>f</sup>	68.14±28.07		24.85±3.34		9.75±2.63	
FFI Level(grade)	High <sup>a</sup>	109.35±3.86	476.824 (<.001)* a>b>c>d	22.50±1.51	6.044 (.001)* a > b,c,d	13.00±2.76	19.082 (<.001)* b,c,d>a
	Good <sup>b</sup>	67.97±13.13		25.11±2.82		9.30±2.29	
	Basic <sup>c</sup>	32.69±8.08		23.06±4.46		12.90±3.77	
	Insufficiency <sup>d</sup>	14.96±6.02		22.84±4.82		11.36±3.34	

\*p<.01, \*\* p<.05

**D. Correlation Among Main Variables**

Correlations among family-friendliness index, job satisfaction, and turnover intention are shown in Table 4. Family-friendliness index and job satisfaction showed positive correlation(r=.152, p=.034), family-friendliness index and turnover intention showed negative correlation(r=-.210, p=.003), and job satisfaction and turnover intention showed negative correlation(r=-.368, p<.001).

Table 4: Correlation among Main Variables

Variable	Family- friendliness index	Job satisfaction	Turnover intention
	r(p)	r(p)	r(p)
FFI	1	.152(.034)**	-.210(.003)*
Job satisfaction		1	-.368(<.001)*
Turnover intention			1

\*p<.01, \*\* p<.05

In addition, the results of analyzing the correlation between primary indicators of family friendliness index, job satisfaction and turnover intention are shown in Table 5. In other words, job satisfaction of the participants showed a positive correlation between flexible working hours of family-friendliness index (r=.157, p=.028), childbirth, parenting and education support systems (r=.272, p<.001), employee support programs (r=.226, p=.001), and family-friendly culture fostering (r=.244, p<.001), and turnover intention of the participants showed a negative correlation between dependent family support system (r=turnover of-.146, p=.039), employee support programs (r=-.265, p<.001), family-friendly culture fostering (r=-.140, p=.047).

Table 5: Correlations between Main Indicators of FFI, Job Satisfaction and Turnover Intention

	Flexible working system	Childbirth, parenting, and education support system	Family dependents support system	Employee assistance program	Family-Friendly Culture program
	r(p)	r(p)	r(p)	r(p)	r(p)
Job satisfaction	.157(<.028)**	.272(<.001)*	.042(.555)	.226(.001)*	.244(<.001)*
Turnover intention	-.123(.087)	-.100(.159)	-.146(.039)**	-.265(<.001)*	-.140(.047)**

\*p<.01, \*\* p<.05

**E. Factors Affecting Married Women’s Turnover Intention**

The effects of research participants’ job satisfaction and family friendliness index upon married women’s turnover intention are shown in Table 6.

That is, from the results of conducting mediated regression analysis with job satisfaction as parameters, family friendliness index as an independent variable, turnover intention as a dependent variable to analyze factors affecting turnover intention of married professional women, their turnover intention was shown to have a significant effect on family friendliness index with a mediator of job satisfaction, which explanatory power was shown to be 15.1%.

Table 6: Factors Affecting Married Women’s Turnover Intention

Variable	B	S.E.	β	t(p)	AdjR2
Constant	4.770	0.354		13.473(<.000)	.151
Job satisfaction	-0.528	0.102	-0.344	-5.161(<.001)	
Family-friendliness index	-0.005	0.002	-0.158	-2.366(.019)	
F=18.393, p<.001					

**IV. DISCUSSION**

This study was to investigate the effects of Korea enterprises’ introduction and utilization of the family-friendly system upon job satisfaction and turnover intention through coexistence of married women’s career and family. To summarize major results of this study, domestic married women’s turnover intention with a mediator of job satisfaction was shown to significantly affect enterprises’ family friendliness index, which explanatory power was shown to be 15.1%. Also, the results of the study revealed that the higher were the indexes relating to flexible working hours, child birth, parenting and educational support programs, employee support system, and family-friendly culture fostering, the higher the job satisfaction of research participants were, and that the lower the indexes of dependents family support system, employee support system and family-friendly culture fostering, the higher the turnover intention of research participants was, showing a negative correlation. This study shows the same research results as in the previous research results that for most people, given the roles of the two most important areas, career area and family area, the fact that the two roles cannot be compatible could easily cause to raise anxiety and negative emotions, and

that stresses created from trying to cope with these troubles could affect job satisfaction of organization members<sup>19, 20</sup>. In particular,<sup>20</sup> demonstrated that in the correlation among conflict between career and households and job satisfaction, women's correlation was higher than men's correlation. As to the effects of enterprises' family friendly system with a mediator of job satisfaction upon turnover intention, the participants in the study were married women, and their job satisfaction showed the highest correlation especially with child birth, parenting and educational support programs among enterprises' various family friendly policies, and their turnover intention showed the highest correlation with employee support system. In the employee support system, introduction and utilization of related counseling programs for employee career and family matters occupied primary indexes, and it is found that the system was thought of as a system to cope with all the conflicts between married women's career and households.

Therefore, in order to increase the job satisfaction of married professional women, and to reduce turnover intention, it is thought that it is necessary to introduce and utilize childbirth and parenting related support systems such as maternity leave system before and after childbirth, childcare temporary retirement, workplace childcare program implementation, etc., and workplace counseling programs to cope with these matters. In addition, the enterprises' family friendliness index was shown to have a significant difference according to job classification, career, enterprise size, and revenue. To explore this in detail, as for job classification, the index was found to be high in cases of manufacturer, career of 10 years or more and the enterprise size of 300 employees or more, and these results correspond to<sup>14</sup> saying that family-friendly culture is different according to the size and the type of enterprises that employees belong to. In other words, enterprises' family-friendly systems in Korea are being introduced mainly for some larger enterprises and public institutions, and it can be thought that in case of small and medium sized business firms and service sector businesses, fostering family-friendly environment is conducted beyond satisfaction. In a situation that Korea's low birth rate and aging are deepening, the family-unfriendly corporate culture is pointed out for childbirth and parenting as a factor of impediment to overcome the low childbirth phenomenon<sup>21</sup>. Fostering a family-friendly social environment can be introduced not only to utilize female employees in the enterprise and improve organizational performance, but it can be a long-term preparation for low birth rate and aging society in the nation and national policies to improve the quality of people's lives as well. Therefore, it is said that it is necessary to prepare national policies to induce active introduction and implementation of family-friendly systems in small and medium sized businesses and service sector businesses as well as large enterprises and public institutions.

## V. CONCLUSION

This study was conducted to contribute to activating corporate family-friendly policies by identifying the effects of corporate family-friendly policies upon married women's job satisfaction and turnover intention and reducing their turnover intention by increasing married women's job satisfaction. The participants of this study were married women working at enterprises and organizations located in Cregion, Korea, and the questionnaire survey was conducted between September and November 2015. The researcher received the research consent from participants after directly giving a description of the study to them, and the survey questionnaire items were fulfilled by them under their voluntary agreement. This study collected a total of 211 questionnaires and excluded 10 questionnaires with missing values and/or improper responding to analyze a total of 201 questionnaires with SPSS 22.0 statistical program. From the results of the study, research participants' job satisfaction showed a positive correlation with flexible working hours( $r=.157$ ), childbirth, parenting and education support programs( $r=.272$ ), employee support programs( $r=.226$ ) and family-friendly culture fostering ( $r=.244$ ), and their turnover intention showed a negative correlation with dependent family support system ( $r=-.146$ ), employee support programs( $r=-.264$ ), family-friendly culture fostering ( $r=-.140$ ). In addition, married professional women's turnover intention was found to affect the family friendliness index with a mediator of job satisfaction, and its explanatory power was 15.1%. Base on the results of the study, to reduce married professional women's turnover intention it is thought that it is necessary to actively introduce and utilize childbirth and parenting related support systems such as maternity leave system before and after childbirth, childcare temporary retirement and workplace childcare program implementation, etc., and workplace counseling programs to talk about these matters, and in order to prepare for low birth rate and aging society and to foster a family-friendly social environment to improve the quality of people's lives, it is said that it is necessary to provide long-term and efficient national support

policies for small and medium sized businesses and service sector businesses that have relatively insufficient family-friendly systems as compared with large enterprises and public institutions.

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## Relationship Between Manufacturing Workers' Job Stress Levels and Health Risk Behavior

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### Abstract---

**Background/Objectives:** The purpose of this study was to examine potential drinking and smoking differences among workers according to their age, the existence of job stress and its levels to find ways of coping with it. This also meant provides information on stress relief in a corporate environment.

**Methods:** The sample consisted of 555 workers of a South Korean company. A self-administered survey and structured interviews were conducted. The Korean Occupational Stress Scale(KOSS) was administered, and the amount of drinking and smoking measured. T-tests and one-way ANOVA were carried out, followed by Duncan's multiple range test for multiple comparisons to evaluate intergroup job stress differences.

**Results:** The Cronbach alpha coefficient of the instrument used in this study was .824, which indicates a high internal consistency. There were significant gender differences. With regard to smoking, job stress differed according to "physical environments" and "job demands"( $p < .05$ ), but not the amount of drinking( $p > .05$ ). The number of male workers who drank seven glasses of alcohol or more, which is a problem behavior, was 404(72.8%) while there were 24 females (52.1%). The findings were statistically significant at the  $p < .05$  level. Smoking history was positively correlated with "physical environments" and negatively correlated with "job demands."

**Improvements/Applications:** It is required to exert an effort for the improvement of health-related behaviors; including smoking and. Businesses should provide temperance and anti-drinking programs for employees' stress regulation to promote their health.

**Keywords---** Job Stress, Drinking, Smoking, Workers, Health Risk Behavior.

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## **I. INTRODUCTION**

In a modern industrial society, advances in technology have brought about rapid changes to industrial and social structures, as well as their environments, which concurred with a wide variety of huge transformations of work surroundings. Stress is a neural, endocrine, immune, and physiological response, as well as a psychological reaction to external stimuli, which tends to be increasingly rampant among many people in modern society that rose to become more and more complicated and segmented.<sup>1</sup> Argued that stress is experienced at work and that it is gradually rising due to heavy workload, role and interpersonal conflicts, as well as feelings about a lack of work autonomy. A job stressor refers to a factor in work that does not fit a worker's competencies or resources available; also, his or her hope or needs may not be met and, there by, this provokes a physical or emotional response that is detrimental to the worker.<sup>2</sup> Chronic job stress affects job satisfaction and turnover and it is linked to growing fatigue or depression symptoms triggered by accumulated emotional conflicts; this can take a huge toll on the organization.<sup>3</sup> In South Korea, workers are both under physical and psychological pressure due to restructuring, job insecurity, and other external factors following the rapidly changing socioeconomic circumstances after the economic crisis in 1997, accompanied by considerable individual pains. The workers' health problems became social concerns when the government tried to promote heavy and chemical industries in the early 1960s as a part of the economic development plan, and their health maintenance was perceived to be important for the enhancement of business productivity.<sup>4</sup> Therefore an industrial safety and health act was legislated in 1981, separated from the labor standards act.<sup>5</sup> The purpose of this study was, therefore, to examine differences among Korean workers in drinking and smoking according to their age, overall job stress and its levels considering their socio demographic characteristics and ways of coping with stress.

## **II. METHODS**

### **A. Data Collection**

A descriptive research study was conducted to explore job stress of selected workers by gathering information about general characteristics, occupational group, age, and their period of service. As for the classification of occupational groups, white-collar jobs, management and research positions were classified into a group of "office workers", where as production workers were regarded "professional production workers." The study purpose was explained to 600 workers from a South Korean manufacturing company. Surveys were conducted with the workers who agreed to participate. A short form of the Korean Occupational Stress Scale was used and the answer sheets from 555 respondents analyzed, except for data from 45 workers which were not readily statistically analyzable.<sup>6</sup>

### **B. Instrument**

Items used in this study were partially taken from the National Health Insurance Service's questionnaire. As for job stress, a short form of the Korean Occupational Stress Scale was put to use; this was an adapted version of the U.S. National Institute for Occupational Safety and Health, modified to suit Korean circumstances.<sup>7</sup> Job stress was scored on a four-point scale (lowest to highest) for all items: "Not at all," (four points) "not really," "somewhat," and "very much" (one point).<sup>8</sup> The Cronbach alpha coefficient of this instrument was .824, which revealed a high internal consistency.

### **C. Data Analysis**

The collected data were analyzed by a statistical package SPSS for Windows, version 22.0. Descriptive data (frequencies, percentages, means, standard deviations) were obtained and the Cronbach alpha coefficient of the job stress inventory was calculated. In addition, one-way ANOVA was utilized to examine differences in general characteristics, occupational group, gender, age, the period of service, drinking, as well as smoking.

## **III. RESULTS**

### **A. General Characteristics of the Subjects**

509 subjects of the 555 workers were male (91.7%) and 46 female(8.3%). 109 respondents belonged to the 20s age group (19.6%) 130 to the 30s(23.4%), 186(33.5%) to the 40s, 128(23.1%) to the 50s, and two were in their 60s(0.4%). By occupational group, office workers numbered 218(39.3%) and professional production workers 337(60.7%). Regarding the periods of service, the most frequent was between 16 and 20

years(n = 146, 26.3%), and the least common one-five years or less(n =69, 12.5%); 77 respondents (13.9%) had worked for 26 years or longer (**Table 1**).

Table 1: General Sample Characteristics (n = 555)

Characteristics	Division	n (%)
<b>Gender</b>	Man	509 (91.7)
	Women	46 (8.3)
<b>Age</b>	20 - 29 years	109 (19.6)
	30 - 39 years	130 (23.4)
	40 - 49 years	186 (33.5)
	50 - 59 years	128 (23.1)
	60 years or older	57 (0.4)
<b>Job</b>	Office	218 (39.3)
	Professionals in the field	337 (60.7)
<b>Years of service</b>	5 or less	69 (12.5)
	6-10 or less	90 (16.2)
	11-15 or less	89 (16.0)
	16-20 or less	146 (26.3)
	21-25 or less	84 (15.1)
	26 or more	77( 13.9)

### B. Job Stressors

"Job demands" were the strongest job stressor(M = 2.33, SD = 0.44), but not statistically significant ( $p > .05$ ). "Relational conflicts" were least stressful(M = 1.97, SD = 0.36, also n.s. at the  $p > .05$  level). However, "physical environments" turned out to be a statistically significant job stressor ( $p < .05$ ) and therefore included in this study as a possible hazards in the manufacturing business(**Table 2**).

Table 2: Technology Statistics for Sub-factors of Job Stress

Division	n	Min	Max	M ± SD
Physical environment	555	1.00	3.33	2.16±.41
Work requirement	555	1.00	4.00	2.33±.44
Voluntary duty	555	1.00	4.00	2.21±.43
Conflict in Relationship	555	1.00	4.00	1.97±.36
Unstable work	555	1.00	4.00	2.01±.54
Structure of Organization	555	1.00	3.57	2.12±.32
Job Competence	555	1.00	4.00	2.14±.38
Work Culture	555	1.00	4.00	2.05±.68

### C. Smoking and Drinking Behaviors

#### a. Smoking Behaviors

215 workers(38.7%) were nonsmokers and 155 workers(27.9%) had quit; smokers numbered 185(33.3%). For nonsmokers, "job demands" were most = (M = 2.39, SD = .45) and "relational conflicts" least stressful (M =1.97, SD =.34). With regard to smokers, "job competency" was the strongest job stressor (M = 2.17, SD = .39) and "relational conflicts" were the weakest (M = 1.97, SD = .37). The corresponding statistics for workers who had quit smoking were "physical environments" (M = 2.18, SD = .39) on one end and "job insecurity" (M = 1.97, SD = .49) on the other end of the extreme. In overall, for smokers "physical environments" and "job demands" were strongest job stressors( $p < .05$ )(**Table 3**).

Table 3: Relationships Between Work Stress and Smoking

Division	Non-Smoker M± SD	Former Smoker M±SD	Smoker M±SD	P
n	215	155	185	
Physical environment	2.07±.40	2.18±.39	2.07±.41	.001
Work requirement	2.39 ±.45	2.07±.45	2.07±.40	.045
Voluntary duty	2.23 ±.44	2.07±.40	2.07±.40	.700
Conflict in Relationship	1.97 ±.34	1.99±.37	1.97±.37	.849
Unstable work	2.00 ±.49	1.97±.49	2.07±.61	.377
Structure of Organization	2.12 ±.32	2.11±.28	2.07±.37	.920
Job Competence	2.14±.40	2.10±.37	2.17±.39	.283
Work Culture	2.06±.40	2.03±.39	2.07±.45	.684

**b. Drinking Behaviors**

For those who drank five glasses of alcohol or less, "job demands" were most (M = 2.36, SD = .25) and "relational conflicts" least stressful (M = 1.99, SD = .34). Drinkers of 10 glasses of alcohol or less likewise reported "job demands" to be most stressful (M = 2.29, SD = .44), but "job insecurity" as the weakest job stressor (M = 1.93, SD = .52). Identical to the former, for those in the group with 15 glasses of alcohol or less, "job demands" were the strongest (M = 2.44, SD = .50) and "job insecurity" was the weakest stressors (M = 2.03, SD = .73). However, drinkers of 20 glasses of alcohol or less disclosed that "physical environments" were most (M = 2.58, SD = .46), and "relational conflicts" least stressful (M = 1.799, SD = .50). There were no statistically significant differences on the  $p > .05$  level for job stress related to drinking amounts (Table 4).

Table 4: Relationship between Drinking Amounts and Job Stress

Division	5 Drinks M±SD	10 Drinks M±SD	15 Drinks M±SD	20 Drinks M±SD	P
Physical environment	2.14±.39	2.14±.40	2.23±.46	2.58±.46	.17
Work requirement	2.36±.25	2.29±.44	2.44±.50	2.18±.47	1.38
Voluntary duty	2.20±.44	2.20±.38	2.35±.53	2.25±.65	.38
Conflict in Relationship	1.99±.34	1.94±.34	2.14±.42	1.79±.50	.14
Unstable work	2.04±.53	1.93±.52	2.03±.73	2.12±.58	.70
Structure of Organization	2.13±.38	2.09±.27	2.15±.25	2.32±.72	.12
Job Competence	2.15±.38	2.12±.39	2.14±.27	2.15±.51	.28
Work Culture	2.08±.42	1.99±.37	2.16±.50	2.00±.44	.28

**D. Correlations of Smoking and Drinking with Job Stressors**

Smoking correlated positively with physical environments and it was negatively with job demands. The amount of drinking was only negatively associated with job demands. Generally, physical environments were positively correlated with job autonomy, relational conflicts, job insecurity, the organizational system, job competency, as well as the workplace culture among the job stressors. In a similar vein, job demands correlated positively with job autonomy, relational conflicts, job insecurity, the organizational system and workplace culture and they were negatively correlated with job competency. Job autonomy displayed positive associations with relational conflicts, job insecurity, the organizational system, job competency, as well as the workplace culture. Relational conflicts correlated positively with job insecurity, job competency, the organizational system, and the workplace culture. Job insecurity factor was also positively correlated with the latter two. Finally, the organizational system factor was positively associated with job competency and workplace culture, while job competency was solely positively correlated with the latter (Table 5).

Table 5: The correlation of Job stress to Smoking and Drinking

	Smoking	Alcohol consumption	Physical Environment	Duty demand	Duty autonomy	Relation conflict	Duty Instability	Organization system	Duty ability	Work culture
Smoking										
Alcohol consumption	.029									
Physical Environment	.188*	.80								
Duty demand	-.098*	-.098*	.064							
Duty autonomy	-.035	.013	.161**	.137**						
Relation conflict	.005	.027	.120**	.095*	.294**					
Duty Instability	.038	.015	.350**	.199**	.093*	.204**				
Organization system	.004	.040	.354**	.234**	.397**	.468**	.378**			
Duty ability	.032	.014	.152**	-.150**	.293**	.157**	.082	.156**		
Work culture	.000	.030	.377**	.230**	.247**	.298**	.477**	.466**	.126**	

\* $p < .05$ , \*\* $p < .01$

#### IV. DISCUSSION

Survey data from specific manufacturing company's workers were examined, which might limit the generalizability of the findings. In the future, Job stress levels and health behaviors need to be investigated in more detail, particularly for the purpose of constructing comprehensive plans that help in workers' job stress management and in providing effective health promotion programs. More extensive research should be conducted, considering a wider variety of variables that might affect stress and health behaviors, as well as the productivity of the respective companies that workers belong to.<sup>9</sup> This study is expected to raise awareness about the importance of health among businesses and to provide useful information for the development of health promotion programs. The instrument used in this study to measure job stress was the short form of the Korean Occupational Stress Scale(KOSS-SF, Chang et al., 2005). This scale covered seven areas by 24 items: job demands (four items), job autonomy (four), relational conflicts (three), job insecurity (two), organizational system (four), improper compensation (three), and workplace culture (four). In addition to these areas, physical environments seemed to be a major job stressor, so three items additionally accounted for this factor. Therefore, the final instrument consisted of 27 items for eight areas. The number of the nonsmokers was 155(27.9%) and this rate was lower than that in data released by Statistics Korea for 2014(42.1%, Park, Jung, 2010). This study's results also correspond to an earlier study on the relationship of job stress levels to health behaviors in male and female workers from large companies. However, the amount of (problem) drinking frequencies was larger among the subjects, which indicates the necessity for temperance and anti-drinking health promotion programs. This study revealed that there was a relationship between job stress and smoking behaviors, linked to material needs and job demands. Additionally, drinking amounts were closely associated to job demands. This is in line with a finding about daily health problems such as a slight cold caused by smoking or drinking also functioned as a factor to detract from workers' productivity.<sup>10</sup> Also found that job stress is significantly related to smoking but not with drinking, which it is similar to the findings of this study.<sup>11</sup> Vigorous competition increases not only psychological stresses but also physical problems.<sup>12</sup> In order to stay fit in this intense competition, one needs to concentrate on one's work<sup>13</sup>

#### V. CONCLUSION

The job stress of manufacturing workers and its relationship with drinking and smoking was investigated. Kang's thesis on the relationship between drinking levels and serum lipid concentrations in male workers found that a larger amount of drinking led to a higher rate of smoking (which are both health-related behaviors), but the study demonstrated that job stress was significantly related only to smoking, but not drinking. To promote the health of manufacturing workers, every business should provide temperance and anti-drinking programs which are interventions geared toward helping them regulate stress in a balanced way.

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# The Effect of Mindfulness-Based Teenager Suicide Prevention Program on the Reduction of Complex PTSD and Suicide Ideation of School Violence Victims

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## Abstract---

The study aims at verifying the effects of Mindfulness Based Teenager Suicide Prevention Program (MBTSP) on the Complex PTSD and suicide thinking. A total of 34 students at a high-risk for suicide were selected for the study. through main cause 2 (feelings and suicide) and main cause 4 (friend issue) of Adolescent Mental-health Problem-behavior Questionnaire (AMPQ) conducted by the Ministry of Education, and experience school violence, and then, 22 students, whose voluntary intention of involvement and parental consent are confirmed, were randomly assigned to experimental group (n = 11) and control group (n = 11). The MBTSP Program is total 10 times, and is formed to train core technology based on mindfulness 2 hours a week. Results indicated that the score of complex PTSD and suicide ideation of a group participating in MBTSP Program decreased meaningfully. In addition, the score of mindfulness and acceptance behavior increased meaningfully; however, the control group did not show a meaningful change. Implicitly, the MBTSP Program is an effective self-regulation program for Complex PTSD and suicide ideation among the youth. The continuous effect of the program was also evident in mindfulness and acceptance behavior levels during a follow-up assessment after 8 weeks. In the end, the limitation of this study and future directions were discussed.

**Keywords---** School Violence, Suicide Ideation, Complex PTSD, Mindfulness Based Teenager Suicide Prevention Program (MBTSP).

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## I. INTRODUCTION

The adolescence is the period when the dependence in the parent's shifts to peers and the youth achieve cognitive and social resources required to form moral judgment and values mainly from their peers. Teenagers learn social skills and obtain emotional support from peer groups but experience dispute and confusion in various relationships with friends. In particular, negative accidents among friends like the physical violence, alienation, threat and violence in schools due to the feature of the adolescence that youth spend more time with friends than family members may affect difficulties in the school lives, as well as overall aspects of social lives. The school violence has been emerged as serious social issues and become the cause of extreme behaviors to the suicide, as well as the loss of self-control due to the traumatic stress to the youth.

A study conducted by Park [1], demonstrated that 4.5 out 10 (44.7%) victims of school violence have suicidal thoughts. By and large, school violence lasts for not only more than one semester but it also exhibits characteristics of Complex Post-Traumatic Stress Disorder (CPTSD) due to the severity of stress caused by interpersonal relationship problems [2]. The recurrence of Complex PTSD has the nature of interpersonal violence [3], deliberately caused by others [4] due to emotional regulation problems such as; self-destruction and suicidal behavior [5]. According to Jeong and Ann [6], school violence was affected consciousness system function and meaningful lives. In addition, low subjective wellbeing of those diagnosed with complex trauma was associated with suicidal behavior [7], affected self-control disorder and cognitive dysregulation [8], self-dysfunction [9], problem behavior as a coping mechanism and self-injurious behavior [10].

Adolescents form peer relationships in schools to feel intimate and a sense of belonging with friends. However, problematic relationships involving school violence may be traumatic to the victim student. According to Hong [11], stressful events occurring in peer relationships increase suicidal ideation among teenagers, while violence experiences occurring between peers affect depression and suicidal behavior [12]. Lee and Jang [13] found that those who experienced complex trauma maladaptive schemas with interpersonal relations use extreme self-destructive behavior as an emotion regulation strategy [14]. Whereas, those who experienced peer harassment showed higher risk of suicidal ideation, various forms of bullying was associated with suicide attempt as well as suicidal ideation [15]. According to Baldry and Winke [16] physical, psychological and verbal abuse from peers at school affected suicidal ideation and suicide attempts. Another study by Flannery et al [17], established that school violence experience was associated with post-traumatic stress disorder, anger, depression, isolation and suicidal ideation.

Foa et al [18] proposed experiential avoidance as a key element for the maintenance of trauma symptoms while experiential avoidance of trauma victims was found to be associated with pain avoidance in many ways including avoidance of intimate relationships and self-injurious behavior [19]. Experiential avoidance behavior may provide short-term pain relief but may lead to an increase in overall pain and other difficulties in the long term. Victims of traumatic events experience the failure of emotion control; however, they consistently use strategies to avoid painful situations. Consequently, experiential avoidance behavior results in a vicious cycle that leads victims to the risk of re-victimizations. It turns out that suppressive/avoidance coping mechanisms to traumatic experiences may give a sense of control and comfort temporarily but causes more severe difficulties not only in emotion regulation but affects the maintenance of PTSD symptoms as well [20, 21]. Thus, mindfulness intervention based therapy is an effective coping mechanism of Complex PTSD.

Mindfulness does not assess whatever arises in the mind as good or bad and leads one to accept the state of the current life as it is. Segal, Williams & Teasdale [22] argued that the mindfulness method for extending attention in a non-judging way helps one to accept emotions such as frustration and regret as they are rather than controlling thoughts or replacing negative images about the past, current or future with positive ones so individuals can be free from automatic and habitual responses. Bishop et al [23] proposed that therapeutic approaches based on mindfulness, supplements the limitations of cognitive behavior therapy that has been applied to existing trauma treatment. The approach helps to cause changes in the mental process that contributes to emotional distress and maladaptive behavior. If immersed in mindfulness, people can experience the phenomenon of mind as it is [24] and wake up from the negative emotions and cognitive scheme caused by it as realizing that thought or feeling coming to mind is not fact but a thing due to their belief or judgment [25].

Kim [26] asserted that the prompt of self-regulation and problem solving occurs based on the characteristics of mindfulness state or due to short-term results. Also, he suggested that if a mindfulness state is caused based on the control of meta-cognitive attention, the person can observe thoughts, emotions, behavior and the motivation he/she is experiencing one step away from the point of view of the observer. This aspect increases the efficiency of self-regulation. mindfulness helps to accept all things of the individual or environment taking place at the present moment as they are [27] and attention and awareness of mindfulness were found to be associated with high levels of subjective wellbeing (low negative emotions, life satisfaction, high positive emotions) and self-fulfilling wellbeing (liveliness, self-realization) [28].

The mindfulness concept has been applied to PTSD therapy in more cases recently. Looking at studies based on mindfulness, mindfulness meditation was applied to PTSD symptoms and alcohol problem [29], PTSD and depression [30], emotional regulation and psychological flexibility [31], experiential avoidance [32], thought suppression and avoidance symptoms [33] etc. and the effect has been verified. Based on several studies on mindfulness, the treatment of various trauma symptoms were found successful. Despite the severity of school violence that causes severe pain to individuals leading to suicidal attempts, previous studies on the efficacy of mindfulness therapy for complex trauma symptoms is inadequate.

Adolescents that are repeatedly subjected to traumatic stress levels such as school violence may easily get depressed. As such, mindfulness may be effective in controlling the negative thoughts or even a small threat of environmental stimuli. Mindfulness not only provide psychological flexibility as a self-regulation mechanism dealing with trauma symptoms due to complex PTSD but can also help individuals to accept experiences as they are by evaluating themselves and targets. Thus, mindfulness based therapeutic intervention is critical when it comes to helping students recover from psychological trauma due to school violence. The program based on mindfulness can be organized by applying Mindfulness Based Teenager Suicide Prevention Program (MBTSP) that Kim and Son [34] modified and supplemented as mindfulness based Stress Reduction Program for verifying the effects of complex trauma and reduction in suicidal ideation.

Hypotheses of this study are as follows:

Hypothesis 1. The mindfulness level of MBTSP Group will increase more than that of the control group.

Hypothesis 2. The acceptance level of MBTSP Group will increase more than that of the control group.

Hypothesis 3. The complex trauma level of MBTSP Group will decrease more than that of the control group.

Hypothesis 4. The suicidal ideation level of MBTSP Group will decrease more than that of the control group.

## II. METHODS

### A. Participants

Participating schools were selected based on the MBTSP program information that was posted through the youth counseling center website located in I City. In particular, this study is significant in the therapeutic intervention to help adolescent victims with psychological problems of school violence and help to promote peer group behavior. Thus, according to the purpose of the whole research process, schools where peer students can participate as well as school violence victim students were mainly selected. A total of 34 people with high-risk to suicidal tendencies and those who experienced school violence were selected from 3 middle schools located in I City and G City. based on the youth emotional behavior characteristics test result factor 2 (mood and suicide) and factor 4 (friend problem). And then, 22 people whose voluntary participation intention and parental consent were confirmed were assigned wirelessly to the mindfulness based program group and waiting control group, 11 people, respectively. Out of these participants, 8 were males (36.4%), while 14 (63.6%) were females. The average age of them was 15.32 years ( $SD = .34$ ).

### B. Tools

#### *Mindfulness Scale*

Mindfulness scale developed by Park [31] was used. This scale consists of four factors of de-centered attention, non-judging acceptance, current awareness and attention concentration and is a five-point Likert scale for a total of 20 questions. De-centered attention refers to looking at from the observer's position without being seized by the phenomena of mind. Non-judging acceptance is the attitude of stopping evaluating or judging their inner experience through thinking and accepting and allowing experience that

occurred as it is. Current awareness means immediate and clear awareness for mind and body experiences occurring in the present moment. Attention concentration means to maintain attention and focus on the current task. In this study, reliability (Cronbach's alpha) in this research was 0.92.

**Acceptance & Action Questionnaire**

Acceptance & Action Questionnaire (AAQ- I ) created by Hayes et al. [36] has been used in previous studies, however, in this study the AAQ-II adapted by Lee and Ahm [37] was used based on a 7-point Likert scale composed of 10 questions. AAQ is a scale used to measure the degree of gladly accepting thoughts and feelings while acting in a manner consistent with their value and purpose. Higher scores mean a higher degree of acceptance and lower degree of experiential avoidance. Reliability (Cronbach's $\alpha$ ) in this study was found to be .87.

**Suicidal Ideation Scale**

The Scale for Suicidal Ideation (SSI) by Beck, Kovacs and Weissman [38] and adopted as a Korean scale, by Park and Shin [39] was used. The SSI scale is a tool used for measuring the severity of thinking about suicide before suicidal attempts based on a five-point Likert scale of 19 items. Higher score means a higher degree of suicidal ideation. Reliability (Cronbach's  $\alpha$ ) in this study was found to be .85.

**Complex Trauma Scale**

In order to evaluate the presence or absence of complex trauma symptoms, the interview sheet developed by Pelcovitz, van der Kolk, Roth, Mandel, Kaplan and Resick [40] and adapted by Jeong and Ann [6] was used. This is a 5-point Likert scale with 45 items composed of 6 sub-compliant diagnosis of complex trauma: changes in emotional arousal regulation, attention and consciousness function, self-perception, relationships with others, somatization symptom and meaningful systems. Reliability (Cronbach's $\alpha$ ) in this study was found to be .89.

**C. MBTSP Program**

MBTSP Program used in this study was composed of a total of 10 sessions with 2 hours per session and mindfulness meditation practice and thematic activity sheet are included in every session. MBTSP Program consists of five key themes (self-understanding, mindfulness, emotional control, interpersonal relation, self-growth). The main contents of the program are presented in Table 1.

Table 1: Contents of MBTSP Program

	Theme	Contents
1	Self-understanding	Consent, collective introduction, written pledge, setting goals, sharing advantages, declaring peace school, understanding of self-injury, evaluating change preparation, breath-counting meditation
2		School violence prevention education, my positive attributes, changing positions(role-play), finding negative trap, positive resources, taking care of themselves, breath-counting meditation
3	Mindfulness	Understanding the main concepts of mindfulness, understanding awareness and acceptance, raisin meditation, pause meditation, walking meditation, breath-counting meditation, 3 minute breathing
4		Understanding mind habits, recording fun activities, describing and assessing, thinking alternatively, If so Quiz, expressing my mind dealing with thoughts, mindfulness extension meditation
5	Emotional control	Understanding stress, Stress Mind Map, worry rolling paper, finding anger patterns, dealing with negative emotions, controlling anger, emptying the framework of my mind, talking to one self positively, mountain meditation
6		What is wise mind, self-regulation evaluation, controlling emotions, gradual emotional control, self as an observer, letting go of thoughts and feeling , compassion meditation
7	Interpersonal relation	Finding meaningful relationships, listening to mindfulness, sympathizing with mindfulness/Accepting as it is, knowing my interpersonal relation type, muscle relaxation, empathy meditation
8		Mind indicators of acceptance, accepting willingly, my favorite proverb, knowing interpersonal relation needs correctly, letting go of relationship needs, silent meditation, nature meditation
9	Self-growth	Thanks questionnaire, my dream work, mindfulness dream mentoring, confidence work diary, thank you mind(game), compassion meditation, forgiving meditation
10		Planning fun activities, mindfulness in daily life, emergency kit in mind, creating my own meditation, happy when you are thankful. compassion mediation

#### **D. Data Analysis**

We carried out independent sample t-test for verifying inter-group pre-homogeneity for complex trauma, suicidal ideation, and mindfulness and acceptance behavior level of MBTSP Program participants. In order to examine the effect of the program, repeated measurement analysis of variance was carried out and matching sample t-test for pre-post-follow up scores was conducted to verify the continued effectiveness of the program.

### **III. RESULTS**

#### **A. Comparison of Pre-homogeneity between MBTSP Group and Control Group**

Before carrying out the MBTSP Program, independent sample t-test was conducted with pre-scores of complex trauma, suicidal ideation, mindfulness, acceptance behavior of MBTSP Group and the control group. There was however, no significant differences found between groups in the complex trauma  $t = .26, p = .12$ , suicidal ideation  $t = .52, p = .21$ , mindfulness  $t = .36, p = .28$ , and the acceptance behavior  $t = .44, p = .32$ . As such, the homogeneity between the two groups was found.

#### **B. Mindfulness**

According to repeated measurement ANOVA of pre, post, follow-up test of two groups for mindfulness, group main effect,  $F(1, 21) = 8.21, p < .01$ , main effect of time,  $F(1, 21) = 12.34, p < .01$ , interaction effect of group and time,  $F(1, 21) = 48.02, p < .01$ , appeared significantly. According to the matching sample t test results, mindfulness of MBTSP Group increased significantly in Pre-Post as shown in  $t = 3.21, p < .01$ , Pre-follow-up test.  $t = 3.82, p < .01$ . On the other hand, all of these differences were not significant in the control group. It suggest that the mindfulness level increased only in the test group in the post-analysis compared to the prior analysis, maintained to the follow-up, indicating that the mindful capability of the test group improved as time lapsed.

#### **C. Acceptance behavior**

According to repeated measurement ANOVA results of Pre, Post, follow-up test of two groups for acceptance behavior, group main effect,  $F(1, 21) = 10.57, p < .01$ , main effect of time,  $F(1, 21) = 10.23, p < .01$ , interaction effect of time and group,  $F(1, 21) = 10.94, p < .01$ , appeared significantly. According to the matching sample t test results, acceptance behavior of MBTSP Group increased significantly in the Pre-Post  $t = 8.12, p < .01$  and a significant increase was shown also in Pre-follow-up test.  $t = 2.42, p < .01$ .

On the other hand, all of these differences were not significant in the control group. The result shows that only the test group increased the acceptance behavior and maintained to the follow-up, indicating that the mindful program was continuously effective in improving the acceptance behavior for the test group.

#### **D. Complex Trauma**

According to repeated measurement ANOVA results of Pre, Post, follow-up test for two groups of complex trauma, group main effect,  $F(1, 21) = 17.24, p < .01$ , main effect of time,  $F(1, 21) = 27.23, p < .01$ , interaction effect of time and group,  $F(1, 21) = 27.91, p < .01$ , appeared significantly. Based on the matching sample t test results, the complex trauma of MBTSP decreased significantly in Pre-Post  $t = 7.27, p < .01$  and a significant decrease was also shown in post-follow-up test,  $t = 3.29, p < .01$ . On the other hand, all of these differences were not significant in the control group. The result shows that only the test group decreased the complex trauma level in the post-analysis and maintained to the follow-up, suggesting that the therapeutic intervention of the mindful program improved the capability for effectively handling symptoms of the complex trauma.

#### **E. Suicidal Ideation**

According to repeated measurement ANOVA results of Pre, Post, follow-up test of two groups for suicidal ideation, group main effect,  $F(1, 21) = 72.14, p < .01$ , main effect of time,  $F(1, 21) = 53.07, p < .01$ , interaction effect of time and group,  $F(1, 21) = 37.24, p < .01$ , appeared significantly. According to matching sample t test results, suicidal ideation of MBTSP Group was found to be significantly reduced in Pre-Post,  $t = 6.45, p < .01$ , and significant reduction was also shown in Pre-follow-up test,  $t = 4.12, p < .01$ . On the other hand, all of these differences were not significant in the control group. The result shows that only the test group decreased the suicide accident and maintained to the follow-up, indicating that the mindful program was continuously effective in decreasing the suicide accident for the test group.

### F. Effect Comparison of MBTSP Program

Analysis of variance (ANOVA) summary table for mindfulness, acceptance behavior, complex trauma, suicidal ideation depending on group (2) and time (3) of MBTSP Group and control group is shown in Table 2.

Table 2: Analysis of Variance Summary Table for Mindfulness, Acceptance behavior, Complex Trauma, Suicidal Ideation Depending on Group (2) and Time (3)

	MBTSP Group (n = 11)			control group (n = 11)			F
	Pre	Post	Follow-up	Pre	Post	Follow-up	
Mindfulness	43.26(3.14)	58.41(5.44)	62.42(4.98)	44.09(2.87)	42.52(3.87)	39.34(3.15)	64.70**
Acceptance behavior	42.34(5.62)	53.84(9.42)	54.02(9.13)	43.73(6.21)	45.24(5.52)	43.21(7.08)	10.94**
Complex trauma	83.45(17.34)	63.12(13.42)	63.14(12.34)	85.64(18.42)	84.08(18.73)	86.36(19.74)	27.91**
Suicidal ideation	22.17(2.56)	14.08(2.77)	14.02(2.69)	23.63(3.61)	22.55(2.73)	22.36(3.20)	37.24**
*p<.05, **p<.01							

## IV. DISCUSSION

This study verified the effects of MBTSP on complex PTSD suicidal ideation reduction. The research findings are as follows: The mindfulness and acceptance behavior of MBTSP group increased significantly after the MBTSP program. These results were the same in the follow-up test conducted in 8 weeks after the program. Thus, the statistical analysis fails to refute hypotheses 1 and 2 that mindfulness and acceptance behavior of MBTSP group will increase than those of the control group. Also, after MBTSP program, complex trauma and suicidal ideation of MBTSP group decreased significantly and the results were the same in the follow-up test conducted in 8 weeks after the program. Therefore, the results fails to refute hypotheses 3 and 4 that complex trauma and suicidal ideation of MBTSP group will decrease than those of the control group.

During MBTSP program, participants could deal with bitterness and negative thoughts objectively without excessive control or avoidance by repeating the training of observing thoughts and feelings as they are without judging them. This is similar to the research findings that if immersed in mindfulness, the person can experience the phenomena of the mind as they are [24] and learn to separate himself/herself from self-critical cognition, helping to reduce the bias against negative evaluation [41].

By experiencing that happiness and unhappiness depend on their mind rather than coming from outside through mindfulness [42], participants escaped from extreme subjective unhappiness that only they are unhappy and this may have influenced attitude toward life and meaning change. Furthermore, as comprehensively observing all other internal elements as well as cognition or motivation, they may have promoted psychological flexibility required to deal with trauma-related problems as well as understanding of the inner self. This is similar to the research findings that mindfulness makes experience clear and promotes self-regulation behaviors and psychological well-being [28]. To easily understand the concept and method of mindfulness, the MBTSP Program is composed of various examples and directives that consider the characteristics of youth clients including various active meditation training such as; mindfulness breathing meditation and compassion meditation that can be applied in daily living. Also, after each session program, daily activities diary writing mindfulness training course for a week was reviewed and difficulties during mindfulness were comforted and detailed instructions were guided. This process may be helpful not only in practicing compassion and acceptance for themselves and targets but also in understanding therapeutic mechanisms of mindfulness and self-healing process. Moreover, in the final session, the whole process was repeated and personal coping strategies were shared and encouraged based on contents learned during the session to maintain self-regulation continuously. This helped participants to have self-belief and self-confidence to solve and overcome trauma-related problems.

The limitations in the study and future directions are as follows: First, in order to verify the effectiveness of mindfulness, the main contents of this program, follow-up studies need to verify the influence by the factor on the reduction in the Complex PTSD and suicidal ideation by reviewing de-centered attention, non-judging acceptance, current awareness and attention concentration by factor, sub-factors of mindfulness scale. In the treatment of clients with complex trauma and suicidal ideation, this will help to organize sessions around more major factors and guide an effective method. Second, the participants of this study are middle school students, so the application of the program depending on various ages of adolescence is not represented.

Third, in order to verify the effectiveness of mindfulness, a comparison group needs to be constructed. In particular, comparative studies of the existing treatment approaches focusing on traumatic memories treatment of PTSD will be significant in the verification effectiveness depending on the cognitive and emotional control methods for traumatic experiences.

The significance of this study is that Mindfulness Based Suicide Prevention Program for Teenager can be used in many psychological characteristics corresponding to trauma-related problems because the program includes a variety of mindfulness skills training to cope with thinking, emotional regulation and interpersonal problems. Furthermore, the study is significant because it enhances the understanding that school violence should be considered as complex PTSD including repeated and sustained complex clinical problems arising from interpersonal relations and that preparing the therapeutic program to deal with complex PTSD Symptoms is necessary. Consequently, this study is significant because of a helpful restorative program that was helpful in personal growth and healing beyond the technical approach required to solve problems by enhancing self-regulation of painful thoughts and feelings and promoting understanding and acceptance for themselves and others. Lastly, this study is significant in terms of verifying the ongoing effects of the program on complex trauma and suicidal ideation through follow up.

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## A Structural Equation Model on Burnout in Female Nurses of Specialized Hospital in Korea

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### Abstract---

**Background/Objectives:** The purpose of this study was to examine a model linking female nurses' depression, resilience to their job burnout.

**Methods/Statistical analysis:** The data was collected from September till December 2015. The data was collected via structural questionnaires gathered by 229 hospital nurses who agreed to participate in the study, and 204 of them were analyzed except for 19 incomplete questionnaires and male nurses. In this study, descriptive statistics for all variables were computed as well as the reliability assessment of the instruments. To analyze relationship in the independent and dependent variables, correlation analysis was used.

**Findings:** The mean age of the participants was 30.95 years. Among the 204 participants, 129 nurses (63.2%) were single. As regards employment type, most nurses have worked in full-time (97.0%). As regards religion, 73 nurses (36.3%) of the respondents were Christian and 20 nurses (10.0%) were Catholic. There were statistically significant positive correlations among job burnout, depression, and resilience, emotional exhaustion, depersonalization, and lower sense of personal accomplishment. Descriptive statistics for depression, job burnout, resilience, control, positivity, and sociality are shown in Table 2. The level of job burnout was  $2.66 \pm .61$  point (ranging 1-5) and the level of depression was  $1.75 \pm .54$ . Resilience was  $3.12 \pm .35$  (ranging 1-5). Resilience was composed 3 sub-scale. The level of self-control was  $3.16 \pm .49$  point (ranging 1-5). The level of positivity was  $3.00 \pm .45$  (ranging 1-5). The level of interpersonal competence was  $3.21 \pm .39$  (ranging 1-5). The model fit indices suggested that the hypothesized model properly fit the data ( $\chi^2=5.87$ ,  $df=4$ ,  $p=.21$ ,  $CFI=.99$ ,  $NFI=.99$ ,  $RMSEA=.05$ ). The depression of nurses directly affected job burnout and also influenced job burnout indirectly through resilience.

**Improvements/Applications:** The findings from this study demonstrated the importance of nurses' resilience as a mediating factor decreasing the job burnout of nurses.

**Keywords---** Job Burnout, Depression, Resilience, Nurse, Specialized hospital.

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## I. INTRODUCTION

The legal basis of a specialized hospital system for the efficiency enhancement of health and medical service system, re-establishment of medical institutions' functions and hospitals' specialization was devised through the amendment of the Medical Law (Jan. 30, 2009), and specialized hospitals are appointed in every three years (Ministry of Health and Welfare, 2014). The Health and Welfare Minister appoints a specialized hospital which serves medical activities having a high level of difficulty with regard to specific diseases or treatment fields (Article 3.5 of the Medical Law) and 99 hospitals were appointed as specialized hospitals in November 2011<sup>1</sup>.

Together with the rapid growth of specialized hospitals, competition among them becomes severe, and high quality service and customer satisfaction are becoming key factors to determine specialized hospitals' competitive edge. Specialized hospitals strengthen their service competitiveness through strategies of customer satisfaction and customer impression. At this point of time, nurse's role handling patients face to face is very important. Therefore, emotional labor of nurses is stood out to cope with patient's increasing demand, complex job relations and working conditions in the hospital environment<sup>1</sup>.

Job burnout is a prolonged response to chronic emotional and interpersonal stressors on the job<sup>2</sup>. In nursing work that needs a face to face contact with a patient, nurses are controlled by fussy job regulations, and personal emotions, thinking and intention become the subjects of control, as well as behaviors or nursing outcome in nurse's job activities. In future, nurses will have worked in more turbulent environment. Job burnout refers to emotional exhaustion, dehumanization and the decline of self-accomplishment suffered by mainly organization members performing interpersonal relation work<sup>3</sup>. Organization members experiencing job burnout have been evaluated to cause the change of jobs, productivity decline and the reduction of job satisfaction, and very negatively affect organizational efficiency<sup>4</sup>. Nurses experience emotional fatigue and job burnout, as they are exposed to much stress through relations with various occupational groups including patients, guardians, doctors and administrative workers. In effect, nurses' positive conviction on nursing job or job satisfaction decreases, and effective role play becomes difficult, due to job burnout<sup>5~6</sup>. Given that group burnout can be caused through diffusion to other people within a group, when job burnout is caused to a person within the group, due to its high infectiousness, coping with nurses' job burnout related to emotional labor and workplace violence can prevent nurses' change of job, and help the improvement of nurses' job satisfaction<sup>7</sup>.

Depression is primarily described in terms of negative feelings, self-depreciation, self-destructive thoughts, and social withdrawal<sup>8</sup>. Depression is also a critical public health problem characterized by persistent low mood accompanied by low self-esteem and a loss of pleasure or interest in normally enjoyable activities<sup>9</sup>. Depressed people cannot control their emotions, and the symptoms last for a long time. If depression was left untreated, it can lead to serious incidents and fatalities<sup>10</sup>. In Korea, the prevalence rate of depression was 18.1% for female and 5.8% for male in the 20-29 years old<sup>11</sup>.

Definition of resilience is an individual's ability to adapt to stress and adversity properly. Also, it refers to an ability to firmly bounce back, although a person reaches the bottom<sup>12</sup>. As every object has different resilience, every person has also different resilience. Most peoples who show strong resilience and bounce back, after they reach the bottom, climb up higher than the original position where they were located<sup>13</sup>. A person may become unhappy or happy, depending on what meaning is given to an unhappy incident or adversity. If a person has a habit accepting things in a positive way, resilience remarkably improves<sup>14</sup>. Namely, resilience means a cognitive ability to return to happy or positive state by overcoming a crisis or adversity, that is, a positive power overcoming adversity. It also means the power to climb up in life from the bottom, and an ability to strongly bounce back, although one reaches the bottom. Two factors are important for strong resilience: one is self-control ability and the other is interpersonal skill with others<sup>12-14</sup>.

Thus, this study was to examine the relationship among job burnout, depression, and resilience of female nurses in Korea and to investigate the meditating effect of resilience in the relationship between depression and job burnout (Figure 1). This study will offer basic data so that the burnout of the nurses in hospitals can be decreased.

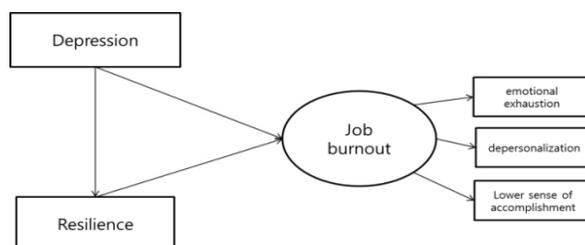


Figure 1: Hypothesized Model

## II. METHODS

### A. Design

In this study, a cross-sectional research design was used to examine the linking of job burnout, depression and resilience among female nurses in South Korea.

### B. Participants

The data was collected via structural questionnaires gathered by 229 hospital nurses who agreed to participate in the study, and 204 of them were analyzed except for 19 incomplete questionnaires and male nurses. The data was collected from September till December 2015. SPSS18.0 statistical program was utilized to analyze the collected data. In this study, descriptive statistics for all variables were computed as well as the reliability assessment of the instruments. To analyze relationship in the independent and dependent variables, correlation analysis was used.

### C. Measurements

#### a. Job Burnout

Job burnout means overall phenomenon of emotional exhaustion, depersonalization, and lower sense of personal accomplishment suffered by organizing members who mainly have personal relationship. In this research, MBI(Maslach Burnout Inventory) developed by Maslach and Jackson<sup>15</sup> was translated into Korean by Choi and Chung<sup>16</sup>. Job burnout is consisted of 3 subscales, they are emotional exhaustion, depersonalization, and lower sense of personal accomplishment. Job burnout has 9 questions of emotional exhaustion, 5 questions of depersonalization, and 8 questions of lower sense of personal accomplishment. Overall 22 questions are analyzed based on the 5-point Likert scale (strongly disagree=1, strongly agree=5). When the scale was developed<sup>16</sup>, Cronbach's  $\alpha$  of total questions was .76. In this research, Cronbach's  $\alpha$  of total questions was .94. And Cronbach's  $\alpha$  was .86 in case of emotional exhaustion, .85 in case of depersonalization, and .89 in case of lower sense of personal accomplishment.

#### b. Depression

The depression scale, developed by Kim and Ann (2006)<sup>17</sup>, was used to measure the adolescents' depression level. There were a total of 8 items including the feeling of sadness or hopelessness. They were based on the 5-point Likert scale (strongly disagree=1, strongly agree=5). Higher score indicates a higher depressive level. In this paper, Cronbach's alpha for depression was measured as .89.

#### c. Resilience

Resilience scale, developed by Reivich and Shatte(2003)<sup>18</sup>, was used to measure the resilience. Resilience developed Reivich and Shatte<sup>18</sup> was translated into Korean by Kim(2007)<sup>19</sup>. Resilience is consisted of 3 subscales which were composed of 5 questions of self-control, 5 questions of positivity, and 5 questions of interpersonal competence. Overall 15 questions are based on the 5-point Likert scale (strongly disagree=1, strongly agree=5). In this research, Cronbach's  $\alpha$  of total questions was .67.

#### D. Data Analysis

The data were analyzed using the statistical software programs, the Statistical Package for the Social Sciences (SPSS, version 17.0) and the Analysis of Moment Structures (AMOS, version 17.0). In the study, descriptive statistics for all variables were computed as well as the reliability assessment of the instruments. T-test and structural equation modeling (SEM) techniques were used to analyze the gender differences and the hypothesized model respectively. All observed variables exhibited multivariate normality. The full information maximum likelihood (FIML) method was utilized to estimate the missing data (A goodness of fit as well as a Chi-square were assessed for the SEM.).

These included incremental fit indices such as Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) and omnibuses fit indices such as Chi-square ( $\chi^2$ ). The  $\chi^2$  is construed as the test of the difference between the hypothesized model and the just identified version of the model. Low non-significant values are desired<sup>20</sup>. However,  $\chi^2$  is very sensitive to the size of sample, so, the null hypothesis is expected to be rejected almost all the time in a model with a relatively large sample size. The incremental fit indices were also used because of this limitation. The fit indices show the proportion of the improvement of the hypothesized model compared to a null model, typically one assuming no correlation among the observed variables. The generally agreed-upon critical value for the CFI and TLI is 0.90 or higher<sup>20</sup>. In addition to that, the Root Mean Square Error of Approximation (RMSEA) was used and evaluated using the criteria that a low value (between 0.00 and 0.06) is indicative of a good-fitting model.

#### E. Ethical Consideration

Nurses in specialized hospital consented to participation after they received the information on the purpose, benefits and potential risks of this study and data collection procedures, and then, the data were collected. A Nurse who was reluctant to participate in the study could refuse participation in this study at any time.

### III. RESULTS

#### A. Demographic Characteristics

Table 1 shows the baseline characteristics of the participants. The mean age of the participants was 30.95 years. Among the 204 participants, 129 nurses (63.2%) were single. As regards employment type, most nurses have worked in full-time (97.0%). As regards religion, 73 nurses (36.3%) of the respondents were Christian and 20 nurses (10.0%) were Catholic. Average internet time by smart-phone per day is shown in Table 1. One to three hours per day, 121 nurses (59.3%); four to 5 hours, 57 (27.9%); and more than 6 hours per day, 26 nurses (12.7%).

Table 1: General Characteristics (N=204)

Variable	Category	Mean±SD, n(%)
Age		30.95±6.93
	20~29	93(46.0)
	30~39	82(40.6)
	≥40 years old	27(13.4)
Marital state	Single	129(63.2)
	Married	75(36.8)
Employment type	Full-time	193 (97.0)
	Part-time	6(3.0)
Income	< 2.0 million won	21(10.8)
	2.0 ~ 2.5 million won	123 (63.1)
	2.5 ~ 3.5 million won	42 (21.5)
	> 3.5 million won	9(4.6)
Religion	Christianity	73(36.3)
	Catholic	20(10.0)
	Buddhism	7(3.5)
	None	101 (50.2)
Internet time by smart-phone per day	1 to 3 hrs	121(59.3)
	4 to 5 hrs	57(27.9)
	≥ 6hrs	26(12.7)

**B. Descriptive Statistics**

Descriptive statistics for depression, job burnout, resilience, control, positivity, and sociality are shown in Table 2. The level of job burnout was 2.66±.61point (ranging 1-5) and the level of depression was 1.75±.54. Resilience was 3.12±.35 (ranging1-5). Resilience was composed 3 sub-scale. The level of self-control was 3.16±.49 point (ranging 1-5). The level of positivity was 3.00± .45 (ranging 1-5). The level of interpersonal competence was 3.21± .39 (ranging 1-5).

Table 2: Mean and SD of Job burnout, Depression, and Resilience (N=204)

Variable	M	SD
Job burnout (1~5)	2.66	.61
Emotional Exhaustion	2.95	.67
Depersonalization	2.42	.76
Lower sense of personal accomplishment	2.45	.68
Depression (1~4)	1.75	.54
Resilience (1~5)	3.12	.35
Self-Control (1~5)	3.16	.49
Positivity (1~5)	3.00	.45
Interpersonal Competence (1~5)	3.21	.39

**C. Correlations**

Table 3 presents inter-correlations among major study variables. There were statistically significant positive correlations among job burnout, depression, and resilience, emotional exhaustion, depersonalization, and lower sense of personal accomplishment.

Table 3: Correlation among Main Variables(N=204)

	Job burnout	Depression	Resilience	Emotional Exhaustion	Depersonalization
Job burnout	1				
Depression	.55***	1			
Resilience	-.41***	-.28	1		
Emotional - Exhaustion	.90***	.53***	-.33***	1	
Depersonalization	.88***	.50***	-.34***	.71***	1
Lower sense of personal accomplishment	.48***	.48***	-.42***	.66***	.72***

**D. Factors Influencing in Job Burnout**

Multiple regressions were conducted to investigate the effects of risk factors on the job burnout in table 4. Depression (t=7.230, p<.001) and positivity (t=-3.447, p=.001) were found to be factors significantly related to job burnout. This result showed that female nurses' with higher depression and a lower positivity tended to have higher levels of job burnout. The model explained 38.0% of the variables.

Table 4: Factors Influencing on Job Burnout

Variables	B	S. E.	Beta	t	p
Age	-.010	.007	-.112	-1.340	.182
Marital status*	.074	.100	.059	.733	.465
Depression	.519	.072	.447	7.230	<.001
Self-Control	-.025	.090	-.020	-.278	.781
Positivity	-.299	.087	-.227	-3.447	.001
Interpersonal Competence	-.189	.120	-.119	-1.551	.123
<i>Adj. R =.380, F(p)=19.698 (p&lt;.001)</i>					

\* Gender(Single=0, Married=1),

**E. The Model Testing**

The initial analysis of the hypothesized model revealed adequate fit to the data ( $\chi^2=5.87$ ,  $df=4$ ,  $p=.21$ , CFI=.99, NFI=.99, RMSEA=.05). All specified paths were significant(See Table 5). We tested a competitive model to improve model fit and to find out whether nurses' resilience fully mediated the relationship

between depression and job burnout (see figure 2). The alternative model resulted in an improper fit to the data ( $\chi^2=64.41$ ,  $df=5$ ,  $p=.001$ ,  $CFI=.85$ ,  $NFI=.85$ ,  $RMSEA=.24$ ). Comparing the hypothesized model with the alternative model ( $\Delta \chi^2_{df=1}=58.54$ ,  $p<.001$ ), the hypothesized model resulted in a substantially better fit to the data. Table 6 presents the summary fitting results for hypothesized and alternative models. The results indicated that the hypothesized structural model fit the data well. Nurses' depression had a significant negative direct effect on resilience ( $\beta=-0.27$ ,  $p<.001$ ) and a significant positive direct effect on job burnout ( $\beta=0.52$ ,  $p<.001$ ) and an indirect effect on their job burnout via resilience ( $\beta=-0.30$ ,  $p<.001$ ) (see figure 3). This result showed that female nurses' with higher depression and a lower resilience tended to have higher levels of job burnout.

Female nurses' depression indirectly affected their job burnout through their resilience. The standardized direct and indirect effects are presented in Table 7. Furthermore, SMC, which explains the effect of female nurses' depression and resilience on their job burnout, was .45.

Table 5: Regression Weights of Hypothesized Model

	Estimate(unstandardized)	Estimate(standardized)	S. E	C. R
Depression--> Resilience	-.17	-.27	.05	-3.85
Depression-->Burnout	.54	.52	.07	7.89
Resilience-->Burnout	-.47	-.30	.10	-4.66

\*\*\* $p<.001$ , \* $p<.05$

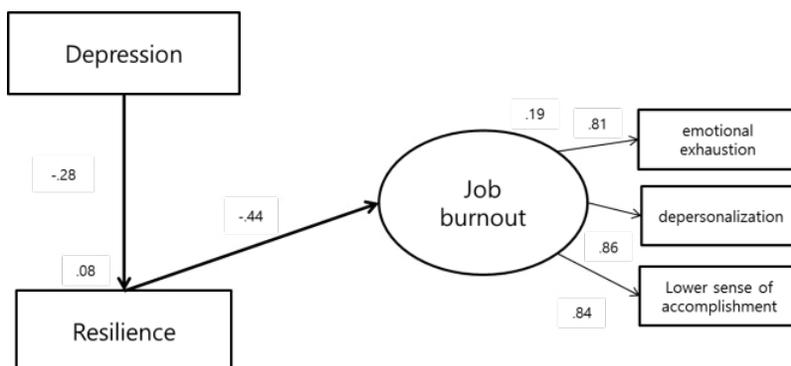


Figure 2: Alternative Model

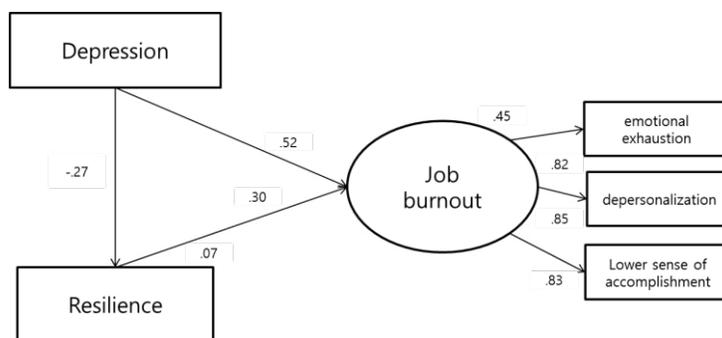


Figure 3: Hypothesized Model(Final Structured Model)

Table 6: Model Fitness Index for Hypothesized Model and Final Structure Model

Model	$\chi^2$	Df	p	CFI	NFI	RMSEA	$\Delta\chi^2$
Hypothesized model (Final structured model)	5.87	4	.21	.99	.99	.05	-
Alternative model (full mediation model)	64.41***	5	.00	.85	.85	.24	58.54

\*\*\* $p < .001$ .

Table 7: Direct and Indirect Standardized Coefficient for the Final Model

Structural paths	standardized direct effect( $\beta$ )	standardized indirect effect( $\beta$ )	total
Depression --> resilience	-.27***	-	-.27
Depression --> job burnout	.52	.08**	.60
Reilience --> job burnout	0.30***	-	-.30

\*\*\* $P < .001$ , \*\* $P < .01$

#### IV. DISCUSSION

The purpose of this study is to examine the linking of job burnout, depression, and resilience among female nurses in South Korea. In multiple regressions, depression and positivity were found to be factors significantly associated with job burnout. According to Chosunllbo<sup>21</sup>, there will be nurses shortage in Korea by 2030. There will be only 321,659 nurses in 2030, while around 500,000 nurses are actually needed. Why does nurses' shortage occur in Korea? Clinical nurses have worked with high job stress compared to other occupations due to shifting work, restriction of autonomy, conflict of interpersonal relations, evaluation of medical institutions, and new technology and information to carry out the nursing of good quality<sup>22-24</sup>. Stress related to a job continues for a long time or occurs repeatedly, not adequately relieving stress, the body becomes exhausted. At this point, nurses would feel burnout and intent to leave and seek other job. A study reported that job conditions played a role to prevent nurses' emotional burnout and the intention of quitting their jobs<sup>25</sup>.

According to the previous study<sup>26</sup>, 67.6% of clinical nurses are exhausted, 36.3% among these showed the turnover intention. The other study reported that the rate of turnover of 443 hospital nurses is 16.9%, when including potential turnover intention<sup>27</sup>, the rate of turnover will increase 70% to 80%<sup>28</sup>. In this study, female nurse's burnout scored 2.66 out of 5.00 and in subcategories, subjects scored 2.95 for emotional exhaustion, 2.42 for depersonalization, and 2.45 for lack of sense of personal accomplishment. Korean nurses have felt middle or less level of burnout. This is similar to the result of this study<sup>29</sup> that examined for clinical nurse's burnout.

On the other hand, some nurses properly overcome heavy stress situations in the clinical setting, some others easily desperate and are exhausted. Resilience means the inner ability to respond flexibly to the environment occurring stress<sup>28</sup>. Resilience is dynamic process to adapt to the environment by negotiation and managing resources in response to the stress, and maintain mental and physical health through the ability to use the environment in favor of ourselves, and regulate a variety of stress in the work<sup>30</sup>. In this study, the resilience of subjects scored 3.12 on average on the 5.00 scale. In subcategories, subjects scored 3.16 for self-control, 3.00 for positivity, and 3.21 for interpersonal competence. This result was a little lower level than the result of 192 clinical nurses working in university medical center.

Furthermore, the overall results of structural equation modeling are very encouraging. The previous study offers a little evidence on whether resilience would work in a mediating capacity, so this structural equation modeling was used to analyze a moderate and mediating model in order to explore how nurse's resilience can impact the relationship between burnout and depression. Nurses' depression had a significant negative direct effect on resilience and a significant positive direct effect on job burnout and an indirect effect on their job burnout via resilience. This result showed that female nurses' with higher depression and a lower resilience tended to have higher levels of job burnout. Female nurses' depression indirectly affected their job burnout through their resilience. Also, nurse's depression were at greater risk factor for burnout ( $\beta = 0.52$ ,  $p < .001$ ). The literature on depression and burnout indicate that tricky abuse, job stress, disengagement and reducing organizational loyalty are largely influential in the manifestation of both these phenomena<sup>31</sup>. However, these researches have focused upon dark side traits such as emotion labor or depression<sup>31</sup>. What still is unknown is the role of bright trait to reduce the nurse' burnout. Korean nurse's depression may play a role as risk factor in the higher incidence of nurse's burnout, and resilience may play a role as protective factor of burnout. The present findings demonstrate the importance of considering protective factor in assessing burnout for nurses in hospital. Indeed, decreasing dramatically the level of depression is not always a

possible option when intervening with burnout nurses. Because there are some nurses with depressive trait by nature. It may be more practical to help increase protective factor, such as resilience<sup>32</sup>.

The present study has some limitations to be taken into consideration while interpreting the findings. Firstly, the depression, resilience, and turnover intention questionnaires were collected using self-report measures in hospital setting. This may have led to biases, such as desirable responses for colleagues or supervisor of hospital. Secondly, because this study is cross sectional in nature, causal inferences cannot be drawn from the results. Any generalization based on the present findings should be made with caution.

## ACKNOWLEDGMENT

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## A Study on Korean Student's Smart Phone Dependency

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### Abstract---

**Background/Objectives:** The purpose of this study is to examine the relationship among smartphone dependency, children's self-esteem, parent's neglect, peer alienation, peer trust, and peer communication in elementary students.

**Methods/Statistical analysis:** This study is a descriptive correlation research designed to examine the relationship among smartphone dependency, children's self-esteem, and parent's neglect, peer attachment. Data were collected from the second NYPI panel survey of 2014. Participants in 2014 were 2110 students of 5<sup>th</sup> grade elementary who agreed to participate in the study. Initial descriptive statistics examined means and SDs of parent's neglect, peer attachment, self-esteem and smart phone dependency as rated by children. Multiple regression equations were computed for boys and girls to determine the variables that influence children's smartphone dependency.

**Findings:** The study participants included 1084 males (51.4%) and 1026 females (48.6%). In correlations among main variables in boys, parent neglect ( $r = .19, p < .001$ ) and peer alienation ( $r = .23, p < .001$ ) in boys were significantly positively related with boys' smartphone dependency. In girl, parent neglect ( $r = .28, p < .001$ ) and peer alienation ( $r = .26, p < .001$ ) in girls were significantly positively related with girls' smartphone dependency. To examine the relative power of variables influencing children's smart phone dependency across gender, two sets of multiple regressions were used. For boys, this model explained 14.4% of the variance in boys' smart phone dependency. Stepwise multiple regression analysis showed that children's self-esteem ( $\beta = -.30, p < .001$ ), parent's neglect ( $\beta = .26, p < .001$ ), and peer alienation ( $\beta = .12, p < .01$ ) were significant independent factors predicting boys' smart phone dependency. For girls, this model explained 16.4% of the variance in girls' smart phone dependency. Stepwise multiple regression analysis showed that children's self-esteem ( $\beta = -.29, p < .001$ ), parent's neglect ( $\beta = .11, p < .001$ ), and peer alienation ( $\beta = .11, p < .01$ ), peer trust ( $\beta = -.10, p < .05$ ) were significant independent factors predicting girls' smart phone dependency.

**Improvements/Applications:** These results implies that health education to prevent smartphone dependency has different approach according gender, suggesting that peer trust is also stressed in preventing girl's smartphone dependency.

**Keywords---** Smartphone Dependency, Children's Self-esteem, Parent's Neglect, Peer Alienation, Peer Trust.

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## I. INTRODUCTION

A smartphone is operated by mobile system which adopts features of a personal computer operating system and other useful features for mobile or handheld use<sup>1</sup>. Smartphones have become the most prevalent communication devices with connecting people to the world. People can conduct work, search information, socialize with others and enjoy leisure activities using the palm-sized device alone<sup>2</sup>. In Korea, the percentage of smartphone user has more than doubled from 31% in 2011 to 63.5% in 2012. Smartphone growing rates is one of the fastest anywhere in the world<sup>2</sup>.

Smartphone dependency is a dependency syndrome of certain people who use mobile phone and exhibit problematic behaviors such as substance use disorders. These behaviors include preoccupation with mobile communication, excessive money or time spent on mobile phones, use of mobile phones in socially or physically inappropriate situations such as driving an automobile. Increased use can lead to increased time spent on mobile communication, adverse effects on relationship with other people, and anxiety if separated from a mobile phone or sufficient signals<sup>1</sup>. According to Society Agency in 2012, the percentage of smartphone addiction was 8.4%, which was found to be higher than the internet addiction of 7.7%<sup>2-4</sup>. According to recent research, 14.2 percent of smartphone users were at risk of addiction in 2014, up from 11.8% percent in 2013<sup>5</sup>. A study reported that utilizing smartphone and text messaging were both positively associated with smartphone users' dependency. Regardless of phone type used, the level of sociability of mobile phone users was positively associated with mobile dependency and symptoms of feeling anxiety and lost, and withdrawal<sup>6</sup>. In addition, teenagers has serious problem with smartphone dependency, logical reasoning, vocabulary and writing skills degenerate because they use their phone all the time and have fewer opportunities to read and analyze books or newspapers<sup>7</sup>.

Parental rearing behavior influences an early relationship between parents and their children and it is known that parental rearing behavior affects children's psychosocial development which includes concept of ego, attitude, values and capacity for his acting performance as well as characteristics and emotional state<sup>8</sup>. It is also continuously reported that adverse parental rearing behavior is related to various problematic behavior and psychopathology<sup>8</sup>. Parental negligence means lack of basic rearing behavior helping sufficient achievement in physical, mental, moral and spiritual aspect of potential power, indifference about overall development of their children and lack of compliment or reprimand for education. It also means that they don't supply something to meet their children's emotional desire. It is reported that parents fostering attitude might affect their children's addiction to internet or cellphone<sup>9</sup>. It is reported that children become more addictive to internet as their parents got more neglecting rearing attitude<sup>10</sup>, and children got stress because of their parents' inappropriate communication skill and rearing attitude and then seemed to be hideout such as internet<sup>9</sup>. They also viewed that a possibility to be addicted to internet became higher because they obtained psychological satisfaction and static support in a cyber space<sup>10</sup>.

The terminology, 'attachment' was used to explain linking relationship between infants and mothers for the first time by Bowl by(1958)<sup>11</sup>, he defined that the 'attachment' was an activity to maintain access of other people or to recover access when it was damaged. The meaning of attachment extended to a maintenance to feel safety in addition to the maintenance of physical contact<sup>12</sup>. As children grow up, they expand their personal relations with parents, family and peers and interaction with peers increase. An adolescent period is a time of change in an attachment relationship with parents and peers as well as physiological, physical and cognitive change<sup>12</sup>. The group of peers whose ages are similar becomes criteria and model of adolescence's action, performs an important role of intermediary and acts decisive role to be accepted and to get recognition from others<sup>13</sup>. The effects of parent and peer attachment fostered adolescent adjustment and facilitate the formation and p preservation of secure relationships<sup>13</sup>. Research has supported that the peer's ability to encourage individual growth is especially an important aspect, and that a secure attachment

between parents and children in their adolescence predicts children's higher self-esteem, greater life satisfaction, better college adjustment, less psychological distress, and greater perceived social support<sup>11-13</sup>

A person who has high self-esteem acts an enthusiastic and creative roll and he has a satisfaction with his life, a happiness feeling and self-confidence for his life whereas a person who has low self-esteem feels an inferiority complex because of his negative attitude and he is pessimist, feels alienated and suffers difficulties in doing interaction with others because of over-consciousness of himself<sup>14</sup>.

Self-esteem means overall subjective emotional evaluation of a person's own worth and encompasses beliefs about self. According to a study, students addicted to smart-phone are graded to aggressiveness, the higher level of loneliness, the lower self-esteem, and parents' control<sup>15</sup>.

This study examines the relationship among smartphone dependency, children's self esteem, and parent's neglect, peer alienation, peer trust, and peer communication in Korea. This study aims to offer basic data so that the smartphone overuse of the elementary students can be decreased.

## **II. METHODS**

### **A. Design**

This study is a descriptive correlation research designed to examine the relationship among smartphone dependency, children's self-esteem, and parent's neglect, peer attachment.

### **B. Participants**

At a were collected from the second NYPI panel survey of 2014. Participants in 2014 were 2110 students of 5<sup>th</sup> grade elementary who agreed to participate in the study.

### **C. Measurements**

#### **a. Parent's Neglect**

To measure parent's neglect, the Children Abuse Scale was used, which was revised and complemented on the basis of Heo<sup>8</sup>Kim<sup>16</sup>. The Child Abuse Scale consisted of child abuse subscale and child neglect subscale. Child Neglect subscale was used in this study.

Child Neglect subscale is a four-item indicator of the degree to how much children are neglected by their parents. All items were measured as a four-point scale ranging from "not at all" to "a lot." The Cronbach's  $\alpha$  of this scale was 0.94.

#### **b. Peer Attachment**

Peer attachment was assessed using the Inventory of Peer Attachment used by Kim<sup>17</sup> and Hwang<sup>18</sup> which was revised on the basis of Inventory of Parent and Peer Attachment (IPPA). Peer attachment was measured using 9 items. IPA consisted of trust (3 items), communication (3 items) and alienation subscale (3 items). IPA asks children to evaluate their relationships with peers. The scale ranges from 1 (extremely dissatisfied) to 4 (extremely satisfied), with higher scores representing higher levels of good relationship with peers. The Cronbach's  $\alpha$  of this scale was 0.92.

#### **c. Self-esteem**

The Self-esteem Scale developed by Rosenberg was used to measure self-esteem<sup>14</sup>. Self-esteem scale comprised of 10 items; Sample items are "I feel that I have a number of good qualities," and "I take a positive attitude toward myself". Each item is answered on a 4-point scale, ranging from "not at all" to "a lot." with high scores indicating high self-esteem. The Cronbach's  $\alpha$  of this scale was 0.92.

#### **d. Smart Phone Dependency**

Adolescents Mobile Dependency Scale was used to measure smart phone dependency, which was revised on the basis<sup>19</sup>. Smartphone dependency was measured using 7 items. Smartphone dependency scale is a four-point Likert scale ranging from 1 (not at all) to 5 (always). The higher score means higher smartphone dependency. The Cronbach's  $\alpha$  of this scale was 0.89.

#### D. Data Analysis

Initial descriptive statistics examined means and SDs of parent's neglect, peer attachment, self-esteem and smart phone dependency as rated by children. To examine the differences in parent's neglect, peer attachment, self-esteem and smartphone dependency by gender, t-tests were used. Pearson product-moment correlations were used to investigate the relationship between parent's neglect, peer attachment, self-esteem and smartphone dependency.

Multiple regression equations were computed for boys and girls to determine the variables that influence children's smartphone dependency. The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) (version 18.0, Inc., Chicago, IL, USA).

#### E. Ethical Consideration

Data were collected from the second NYPI panel survey of 2014. Participants in 2014 were 2110 5<sup>th</sup> grade elementary who agreed to participate in the study.

### III. RESULTS

#### A. Demographic Characteristics

The baseline characteristics of the participants are shown in Table 1. The study participants included 1084 males (51.4%) and 1026 females (48.6%). The subjective health status was as follows: very good health, 863 (40.9%); good health, 1181 (56.0%); bad health, 63 (3.0%); very bad health, 3 (0.1%). Average income of family was 4927.71 ten thousand won

Table 1: General Characteristics (N=2110)

Variable	Category	n(%), Mean±SD
Gender	Male	1084 (51.4)
	Female	1026 (48.6)
Subjective health Status	Very good	863 (40.9)
	good	1181 (56.0)
	bad	63 (3.0)
	Very bad	3 (0.1)
Family Income(ten thousand won)		4927.71± 2502.42

#### B. Descriptive statistics

Descriptive statistics for parent's neglect, peer communication, peer alienation, peer trust, children's self-esteem, and smartphone dependency are shown in Table 2. Parent's neglect perceived by children was 1.44±.49(ranging 1-4).The level of peer communication was 3.17±.60 (ranging 1-4), the level of peer alienation was 1.91±.67,and the level of peer trust was 3.25±.61 point (ranging 1-4).The level of children's self-esteem was 3.16±.44 point (ranging 1-4). The level of smartphone dependency was 1.85±.67 point (ranging 1-4).

Table 2: Descriptive Statistics for Variables(N=2110)

Variable(Range)	Mean±SD
Parent's neglect (1-4)	1.44±.49
Peer attachment (1-4)	
Peer communication	3.17±.60
Peer alienation	1.91±.67
Peer trust	3.25±.61
Children's self-esteem (1-4)	3.16±.44
Smartphone dependency (1-4)	1.85±.67

#### C. Main Variables according to Gender

Initial tests investigate the difference in main variables across gender (see Table 3). Girls and boys differed significantly on peer communication ( $t = -4.81, p < .001$ ), peer alienation ( $t = 4.12, p < .001$ ), peer trust ( $t = -4.20, p < .001$ ), self-esteem ( $t = 2.03, p < .001$ ). Girls scored significantly higher than boys on peer communication and peer trust, however, boys scored significantly higher than girls on peer alienation and self-esteem. However, boys and girls did not differ significantly on perceived parent's neglect and smartphone dependency.

Table 3: Gender Difference for Main Variables (BOYS = 1,086, GIRLS=1,024)

		gender	Mean(SD)	t
parent's neglect		boys	1.44±.48	-.23
		girls	1.45±.51	
Peer attachment	peer communication	boys	3.11±.62	-4.81***
		girls	3.24±.56	
	peer alienation	boys	1.97±.69	4.12***
		girls	1.85±.64	
	peer trust	boys	3.20±.62	-4.20***
		girls	3.31±.58	
Self-esteem		boys	3.18±.43	2.03*
		girls	3.14±.46	
smartphone dependency		boys	1.83±.66	-1.28
		girls	1.87±.67	

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

**D. Main Variables according to Subjective Health Status**

Initial tests investigate the difference in main variables across subjective health status (see Table 4). Between students in very good health and in bad health differed significantly on peer trust ( $F=4.09, p=.017$ ). Students in very good health scored significantly higher than students in bad health on peer communication. However, there is not significantly difference in variables according to subjective health status.

Table 4: Main Variables according to Subjective Health Status (N=2110)

Main Variables(Range)	Subjective health status	Mean(SD)	F	
Parent's neglect(1-4)	Very good	1.41±.49	1.41	
	Good	1.46±.49		
	Bad	1.45±.48		
Peer attachment(1-4)	Peer communication	Very good	3.20±.61	2.56
		Good	3.17±.59	
		Bad	3.04±.54	
	Peer alienation	Very good	1.91±.69	1.69
		Good	1.91±.66	
		Bad	1.77±.66	
	Peer trust	Very good	3.31±.58a	4.09*
		Good	3.24±.61	
		Bad	3.12±.55b	
Self-esteem (1-4)	Very good	3.18±.47	1.98	
	Good	3.15±.44		
	Bad	3.08±.45		
Smartphone dependency(1-4)	Very good	1.85±.66	.08	
	Good	1.85±.67		
	Bad	1.82±.63		

\* $p < .05$

**E. Correlation among Main Variables**

Correlations among main variables in boys are shown in Table 5. Parent neglect ( $r = .19, p < .001$ ) and peer alienation ( $r = .23, p < .001$ ) in boys were significantly positively related with boys' smartphone dependency. However, peer trust ( $r = -.10, p < .001$ ) and self-esteem ( $r = -.35, p < .001$ ) in boys were significantly negatively related with boys' smartphone dependency. There was no significant relation between peer communication and boys' smartphone dependency.

Table 5: Correlation among Main Variables in Boys (Boys= 1,086)

	Parent's neglect	Peer-communication	Peer-alienation	Peer-trust	Children's self-esteem	Smart-phone dependency
Parent's neglect	1	-.41***	.11***	-.41***	-.42**	.19***
Peer-communication		1	-.12***	.76***	.35***	-.06
Peer-alienation			1	-.21***	-.36***	.23***
Peer-trust				1	.39***	-.10***
Children's self-esteem					1	-.35***
Smart-phone dependency						1

\*\* $p < .01$ , \*\*\* $p < .001$

Correlations among main variables in girls are shown in Table 6. Parent neglect ( $r = .28, p < .001$ ) and peer alienation ( $r = .26, p < .001$ ) in girls were significantly positively related with girls' smartphone dependency. However, peer communication ( $r = -.18, p < .001$ ), peer trust ( $r = -.13, p < .001$ ) and self-esteem ( $r = -.38, p < .001$ ) in girls were significantly negatively related with girls' smartphone dependency.

Table 6: Correlation among Main Variables in Girls (Girls= 1,024)

	Parent's neglect	Peer-communication	Peer-alienation	Peer-trust	Children's self-esteem	Smartphone dependency
Parent's neglect	1	-.42***	.28***	-.37***	-.51**	.28***
Peer-communication		1	-.32***	.73***	.41***	-.18***
Peer-alienation			1	-.35***	-.44***	.26***
Peer-trust				1	.39***	-.13***
Children's self-esteem					1	-.38***
Smartphone dependency						1

\*\* $p < .01$ , \*\*\* $p < .001$

### F. Factors Influencing on Smartphone Dependency

To examine the relative power of variables influencing children's smartphone dependency across gender, two sets of multiple regressions were used. For boys, this model explained 14.4% of the variance in boys' smartphone dependency. Stepwise multiple regression analysis showed that children's self-esteem ( $\beta = -.30, p < .001$ ), parent's neglect ( $\beta = .26, p < .001$ ), and peer alienation ( $\beta = .12, p < .01$ ) were significant independent factors predicting boys' smartphone dependency (see Table 7).

Table 7: Multiple Regression to Predict Boys' Smartphone Dependency (Boys= 1,086)

	Model 1		Model 2		Model 3	
	B	$\beta$	B	$\beta$	B	$\beta$
constant	1.44		.95		2.50	
parent's neglect	.27	.19***	.25	.18***	.14	.26***
peer-communication			-.07	.06	.09	.09
peer-alienation			.20	.21***	.12	.12**
peer-trust			-.03	-.03	-.03	-.03
children's self-esteem					-.46	-.30***
F	32.31***		13.54***		61.38***	
R <sup>2</sup>	.037		.082		.144	

\*\* $p < .01$ , \*\*\* $p < .001$

For girls, this model explained 16.4% of the variance in girls' smartphone dependency. Stepwise multiple regression analysis showed that children's self-esteem ( $\beta = -.29, p < .001$ ), parent's neglect ( $\beta = .11, p < .001$ ), and peer alienation ( $\beta = .11, p < .01$ ), peer trust ( $\beta = -.10, p < .05$ ) were significant independent factors predicting girls' smart phone dependency (see Table 8).

Table 8: Multiple Regression to Predict Girls' Smartphone Dependency (Boys= 1,024)

	Model 1		Model 2		Model 3	
	B	$\beta$	B	$\beta$	B	$\beta$
constant	1.53		1.12		2.57	
parent's neglect	.37	.28***	.29	.21***	.15	.11***
peer-communication			-.60	-.08	-.06	-.05
peer-alienation			.20	.19***	.12	.11**
peer-trust			.08	.07	-.11	-.10*
children's self-esteem					-.42	-.29***
F	78.35***		12.84***		24.53***	
R <sup>2</sup>	.077		.114		.164	

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

#### IV. DISCUSSION

We conducted a survey to examine the relationship among smartphone dependency, children's self-esteem, parent's neglect, peer alienation, peer trust, and peer communication in elementary students. Initial tests investigate the difference in main variables across gender. Girls and boys differed significantly on peer communication ( $t = -4.81, p < .001$ ), peer alienation ( $t = 4.12, p < .001$ ), peer trust ( $t = -4.20, p < .001$ ), self-esteem ( $t = 2.03, p < .001$ ). Girls scored significantly higher than boys on peer communication and peer trust, however, boys scored significantly higher than girls on peer alienation and self-esteem. Our finding is partially similar from the result of an earlier study<sup>20</sup>. Meta-analytic study reported that girls were significantly more attached to their peers than boys<sup>20</sup>. It means that girls may also be more likely than boys to draw support from their peers. While gender differences on peer communication and peer trust seemed to be consistent with the other study<sup>20</sup>, differences on peer alienation are less consistent. Research reported that males were more alienated than females, being similar result in our finding<sup>21</sup>. However Song<sup>22</sup> suggested those females were more alienated than males, which is not consistent of our result. Where as boys scored significantly higher than girls on self-esteem in our study. This result is similar to the result of an earlier study<sup>23</sup>. Self-esteem is typically understood to reflect the feeling of being satisfied with oneself and believing that one is a person of worth<sup>24</sup>. Self-esteem is shaped by individuals' opinion of their own self and how they are perceived by significant others and is likely to vary between genders during. In other aspect, under the influence of the Confucianism philosophy, Korea parents had more expectation to their sons than daughters and our society still value men more than women<sup>25</sup>.

This study finds that there was a negative correlation between smartphone dependency and children's self-esteem, which parallels the results of the prior study<sup>26</sup>. A scholar argued that high smartphone dependency comes with low self-esteem<sup>27</sup>. Smart-phone dependency means using cell phone habitually to feel depression or irritation when a cell phone is not available. There is a negative correlation between smartphone dependency and self-esteem. Teenagers whose self-esteem are high have a confidence about their future and then they are active and stable, feel themselves valuable, expect something actually and are friendly towards other people. However, Teenagers whose self-esteem is low have anxiety about their future. Their relationship with other people is unstable and, by extension, they show high correlation with drug abuse, misconduct, depression and suicide<sup>28</sup>. In the teenagers who have low esteem, there is possibility that they feel an attraction to cell phone which provides constant contact anytime to confirm their existence and to pursuit their mental security<sup>29</sup>. In this study, we finds that there was a positive correlation between smartphone dependency and parent neglect, which is similar to the study<sup>30</sup> in that reported that parent neglect attitude is the highest factor among the predicting factors of smartphone addiction. We can see that smartphone dependency is higher as degree of parent's neglect is higher. The degree of parent's neglect is high means that they are short of rearing time for their child because of working together for a living or they don't know well where their children are and what their children do in student life or after school life because they are indifferent to rearing their children. We can think that appropriate praise and concern, in other words, not neglecting their children can do a buffer role to reduce smartphone dependency. Accordingly, it is needed to provide education program to parent to make them doing appropriate management and having affective attitude for their children as an effort to reduce smartphone dependency, To practice that, an attempt is needed to develop parent education programs and family counsel programs grafting with preventive educations for smartphone<sup>31</sup>.

There is gender difference in stepwise multiple regression analysis to predict smartphone dependency between boys and girls. Children's self-esteem, parent's neglect, and peer alienation were significant independent factors predicting boys' smartphone dependency. Whereas, in case of girls, Children's self-esteem, parent's neglect, and peer alienation, peer trust were significant independent factors predicting girls' smart phone dependency. In the present study, peer trust has affected on only girl's smartphone dependency, which is similar to the study reported that there were significant differences between boys and girls regarding smart phone addiction, emotional regulation style and perceived peer attachment<sup>32</sup>. Girls used

their smartphone appropriately when peer attachment was stable, trust was high, communication was smooth, and alienated feeling was reduced<sup>32</sup>. These results implies that health education to prevent smartphone dependency has different approach according gender, suggesting that peer trust is also stressed in preventing girl's smartphone dependency.

In Korea, smartphone recently quickly gained popularity with the rapid expansion of the mobile market<sup>4</sup>. Therefore, it is considered to conduct continuous study for this matter. Also the results of this study support the importance of peer attachment and parent relationship with children and self-esteem in decreasing smartphone dependency<sup>30</sup>.

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# Smartphone Overuse, Interpersonal Relationship Anxiety, and Self-Control in Nursing College Students

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## Abstract---

**Background/Objectives:** The objective of this study was to investigate the interpersonal relationship anxiety and self-control according to the degree of smartphone overuse in nursing students

**Methods/Statistical analysis:** A total of 200 second-, third-, and fourth-year nursing students who used smartphones. Participants' smartphone overuse was measured; data from 101 participants was used (the top and bottom 25% of measured smartphone overuse; 48 and 53 students, respectively). Data were analysed using SPSS v.19.0. Participant demographics were compared between the participant groups using chi-squared tests and t-tests. Interpersonal relationship anxiety and self-control were compared between the groups using t-tests.

**Findings:** These groups did not differ significantly regarding age, sex, academic year, grade or peer relationships. Mean duration of smartphone usage varied significantly between the high- and low- overuse groups (6.04 and 3.56 hours, respectively  $p < .001$ ). Mean interpersonal relationship anxiety and self-control scores differed significantly between the high- and low-overuse groups (interpersonal relationship anxiety: 2.91 and 2.62, respectively,  $p = .024$ ; self-control: 2.62 and 3.35, respectively,  $p < .001$ ).

**Improvements/Applications:** These findings suggest that interventions aiming to prevent smartphone addiction should decrease smartphone usage, improve social relationships, and promote self-control.

**Keywords---** Smartphone Overuse, Interpersonal Relationship Anxiety, Self-control, Nursing College Student.

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## I. INTRODUCTION

A smartphone is a wireless telephone equipped with computer functions<sup>1</sup>, and its social impact is increasing owing to the convenience it offers in accessing services and information without constraints of time or space<sup>2</sup>. However, the excessive habitual use of smartphones without clear purposes continues to increase the level of smartphone overuse, causing depression, anxiety, social maladaptation, hindrance to learning, and withdrawal symptoms<sup>3</sup>. In particular, the smartphone overuse risk group among 20s accounts for 24.2% of all adults. This proportion is much higher than that in adults of other age groups, and is increasing rapidly every year<sup>4</sup>. With respect to the degree of smart phone addiction among college students, the addiction level was higher when the interpersonal relationship was worse<sup>5</sup>, and self-control was lower<sup>6</sup>.

The smartphone overuse of students is accelerating compared to that of other age groups, and interpersonal relationship anxiety and self-control are affecting it. However, so far, no study has examined interpersonal relationship anxiety and self-control according to the degree of smartphone overuse in nursing students who are under heavier stress concerning their major and have a strong smartphone overuse as compared to non-nursing students. Therefore, this study aimed to investigate interpersonal relationship anxiety and self-control according to the degree of smartphone overuse in nursing students, and to provide basic data for the prevention of smartphone overuse.

## II. LITERATURE REVIEW

Interpersonal relationship anxiety is an obvious and continuous fear of situations in which a person can be exposed to others or the others can see him, and being afraid of acting embarrassingly or awkwardly in such situations<sup>7</sup>. Nursing students, in particular, experience interpersonal relationships with a variety of subjects in clinical practice. It is reported that they have a high level of interpersonal relationship anxiety caused by encounters with medical staff and patients in unfamiliar situations<sup>8</sup>. Nursing students were shown the significant correlations between the interpersonal relationships and satisfaction in clinical practice ( $r=.24$ ,  $p<.001$ ). So, the interpersonal relationships need to be improved to increase nursing students' satisfaction with clinical practice<sup>9</sup>. In studies that investigated the correlation between the anxiety and addiction of undergraduates, mobile phone addiction was stronger when interpersonal anxiety was greater<sup>10</sup>; and the college students with a higher extent of smartphone overuse experienced increase anxiety. Moreover, subjects with higher anxiety were more likely to have poor interpersonal relationships<sup>5</sup>; and while college students were gradually addicted to the use smartphones, they experienced mental anxiety<sup>11</sup>. The subjects had fear and anxiety in interacting with others due to their smartphone overuse.

Self-control is controlling an immediate desire or behavior in order to achieve long-term goals<sup>12</sup>, and making reasonable decisions by consciously controlling oneself when usual reactions are not desirable<sup>13</sup>. Addiction means losing the capability to control oneself<sup>14</sup>, and thus, self-control is an important element of addiction. When the self-control capacity of college students was greater, the level of smartphone overuse was lower<sup>15</sup>, and the students from the smartphone overuse risk group had a lower self-control capacity than non-addicted students did<sup>16</sup>, and they were positive correlations among smartphone addiction, aggression and impulsion<sup>17</sup>. Moreover, among nursing students, the smartphone overuse risk group showed a lower level of self-control than the non-addiction group did<sup>18</sup>.

The objective of this study was to investigate the interpersonal relationship anxiety and self-control according to the degree of smartphone overuse in nursing students. The following were the concrete objectives:

- To examine the general characteristics of the subjects according to the degree of smartphone overuse.
- To examine the interpersonal relationship anxiety and self-control of the subjects according to their degree of smartphone overuse.

### III. METHODS

#### A. Design

This research used a cross-sectional design to examine smartphone overuse's correlation with interpersonal relationship anxiety and self-control.

#### B. Participants and data collection

A total of 200 second-, third-, and fourth-year students who used smartphones participated; participants were recruited from nursing departments in three universities located in D city. All participants autonomously provided a written indication of consent to participate. Participants' smartphone overuse was measured; data from 101 participants was used (the top and bottom 25% of measured smartphone overuse; 48 and 53 students, respectively).

Data collection was completed after detailed explanations of the present research's context and objectives were provided to the relevant university professors, who were subsequently asked to cooperate. Regarding ethical considerations, the researchers directly explained the present study's purposes and methods to all participants and guaranteed their anonymity and the confidentiality of all collected data. Participants were informed that they could withdraw from the study at any time study without penalty, and that collected data would be anonymous and used for no other purpose than that of the present study. Participants received small gifts after completing surveys. Each participant was informed that he or she would retain the gift if the participant withdrew from the study; most participants completed the survey in approximately 15 min.

#### C. Measures

##### a. Smartphone Overuse

Smartphone overuse was measured using the Adult Self-Administered Smartphone overuse Scale, developed by the National Information Society Agency<sup>19</sup>. This scale contains 15 items; responses use a 4-point Likert scale (1 = *not at all*, 4 = *very much so*). Scores could range between 15 and 60 points; higher scores indicated more addiction. This measure's reliability was Cronbach's  $\alpha = .89$  at the time of its development and  $.87$  in this research.

##### b. Interpersonal Relationship Anxiety

Interpersonal relationship anxiety was measured using the Korean version of the Interpersonal relationship anxiety Scale<sup>20</sup>. This scale contains 36 questions; responses use a 5-point Likert scale (1 = *not at all*; 5 = *very much so*). Scores could range between 36 and 180 points; higher scores indicated greater interpersonal relationship anxiety. This measure's reliability was Cronbach's  $\alpha = .88$  in Kim (1995)<sup>20</sup> and  $0.88$  in this research.

##### c. Self-control

Self-control was measured using the Brief Self-Control Measure<sup>21</sup>. This scale contains 13 questions; responses use a 5-point Likert scale (1 = *not at all*, 5 = *very much so*). Scores could range between 13 and 65 points; higher scores indicated greater self-control. This scale's reliability was Cronbach's  $\alpha = .89$  in<sup>21</sup> and  $.84$  in this research.

#### D. Data Analysis Methodology

Data were analysed using SPSS v.19.0. Participant demographics were compared between the participant groups using chi-squared tests and t-tests. Interpersonal relationship anxiety and self-control were compared between the groups using t-tests.

### IV. RESULTS

#### A. Participant Demographics and Smartphone Overuse

The high- and low-overuse groups contained 48 and 53 participants, respectively as shown in Table 1. These groups did not differ significantly regarding age, sex, academic year, grade or peer relationships. Mean duration of smartphone usage varied significantly between the high- and low-overuse groups (6.04 and 3.56 hours, respectively;  $p < .001$ ).

Table 1: Difference in General Characteristics according to Smartphone Overuse Levels

Variables	Categories	Upper25%	Lower25%	t/ $\chi^2$	p
		(n=48) n (%) or M $\pm$ SD	(n=53) n (%) or M $\pm$ SD		
Age(year)		20.88 $\pm$ 1.77	20.74 $\pm$ 1.69	-0.404	.687
Gender	Female	9(18.75)	11(20.75)	0.64	.801
	Male	39(81.25)	42(79.25)		
Academic year	Sophomore	23(47.92)	30(56.60)	1.649	.648
	Junior	11(22.92)	9(16.98)		
	Senior	14(29.16)	14(26.42)		
Academic score		3.43 $\pm$ 0.56	3.60 $\pm$ 0.39	1.136	.263
Perceived relationship of peer	Very good	3(6.25)	3(5.66)	7.380	.061
	Good	20(41.67)	33(62.26)		
	Moderate	21(43.75)	17(32.08)		
	Bad	4(8.33)	0(0)		
Smartphone use time(hour)		6.04 $\pm$ 3.19	3.56 $\pm$ 1.51	-5.080	<.001*

M=mean, SD=standard deviation, \* $p$ <.01

### B. Smartphone Overuse, Interpersonal Relationship Anxiety, and Self-control

Table 2 compares interpersonal relationship anxiety and self-control between the high- and low-overuse groups.

Mean interpersonal relationship anxiety and self-control scores differed significantly between the high- and low-overuse groups (interpersonal relationship anxiety: 2.91 and 2.62, respectively,  $p = .024$ ; self-control: 2.62 and 3.35, respectively,  $p < .001$ ).

Table 2: Difference in Interpersonal Relationship Anxiety and Self-control According to Smartphone Overuse Levels

Variables	Upper25%	Lower25%	t	p
	(n=48) n (%) or M $\pm$ SD	(n=53) n (%) or M $\pm$ SD		
Interpersonal relationship anxiety	2.91 $\pm$ 0.68	2.62 $\pm$ 0.62	-2.284	.024*
Self-control	2.62 $\pm$ 0.41	3.35 $\pm$ 0.50	8.011	<.001**

M=mean, SD=standard deviation, \* $p$ <.05, \*\* $p$ <.01

## V. DISCUSSION

This study aimed to identify the interpersonal relationship anxiety and self-control in nursing students according to the degree of their smartphone overuse, and thus, to offer basic data for designing intervening measures to prevent smartphone overuse in nursing students.

Findings revealed that the top 25% smartphone overuse group among the subjects demonstrated a significantly longer time spent using a smartphone ( $p < .001$ ) as compared to the bottom 25% group. This corresponded to the results that the smartphone overuse scale and time spent on smartphone use had a positive correlation ( $r = .26$ ,  $p < .001$ )<sup>22</sup>, and that the smartphone overuse score increased with an increase in the daily time spent on using a smartphone ( $F = 7.61$ ,  $p < .001$ )<sup>23</sup>. This also corresponds to the results of a study conducted on nursing students<sup>18</sup>, which reported that the group with a longer daily time spent using a smartphone demonstrated a higher degree of smartphone overuse ( $F = 10.31$ ,  $p < .001$ ). With reference to addiction disorder, the probability of addiction increases with an increase in the time spent on the addictive substance. These results are in accordance with such characteristics of addiction<sup>24</sup>. As smartphones are evolving into a comprehensive cultural service media encompassing unlimited access to information, education, gaming, transportation, and finances<sup>5</sup>, it is anticipated that the time spent on a smartphone will increase even further. Therefore, it is necessary to establish management measures to prevent smartphone overuse based on the increasing time spent on a smartphone.

In this study, the top 25% smartphone overuse group had a more severe interpersonal relationship anxiety ( $p=.024$ ) and lower self-control ( $p<.001$ ) than the bottom 25% group did. Simply put, it is evident that the addiction becomes more serious when the interpersonal relationships of smartphone users are not good and their interpersonal relationship anxiety is higher. This corresponds to the following results of other studies: that the degree of smartphone overuse of students is higher when their interpersonal relationship problem is more serious ( $r=0.43, p<.001$ )<sup>25</sup>; that smartphone dependence is lower when social support increases ( $r=-0.14, p<.05$ )<sup>26</sup>; that the smartphone overuse was lower when interpersonal relationship support was higher ( $r=-0.165, p<.01$ )<sup>15</sup>; that the level of adaptation to college life was lower ( $r=-0.354, p<.01$ ) when the degree of smartphone overuse was higher<sup>16</sup>; that the phenomenon of smartphone overuse affected school life ( $t=3.955, p=.036$ ) and caused problems in interpersonal relationships ( $t=3.624, p<.001$ )<sup>3</sup>; and that the learning flow was weaker when the smartphone overuse of nursing students was more serious ( $r=-.24, p=.008$ )<sup>27</sup>.

In the present study, the top 25% smartphone overuse group demonstrated a lower level of self-control ( $p<.001$ ) than the bottom 25% group did. This corresponded to the finding of the study conducted by<sup>3</sup> that self-control was a significant factor ( $\beta=-.15, p<.05$ ) influencing the smartphone overuse of general college students. It is also in line with some previous studies<sup>4,15,16,18,28</sup> that reported that self-control has an effect on smartphone overuse. One of the studies conducted on college students<sup>15</sup> reported that the effect of self-control on smartphone overuse was significant ( $\beta=-0.147, p<.05$ ) on all subjects; however, when the subjects were categorized into an at-risk smartphone user group and normal smartphone user group, self-control did not have a significant effect on smartphone overuse in each group. It is thought that self-control has a great influence on smartphone overuse. Namely, people with self-control do not become addicted to smartphones and will be able to adequately perform real life tasks.

## VI. CONCLUSION

These results show that measures are required to increase the self-control of nursing students, and prevent and cure their smartphone overuse.

This study was conducted on nursing students in one region, and the study results cannot be fully generalized. However, its significance is found in that the interpersonal relationship anxiety and self-control of nursing students based on their smartphone overuse were examined, and it established intervention measures for the prevention of smartphone overuse in nursing students.

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# The Relation between Parental Acceptance-Rejection Recognized by Middle School Students and their Depression and Personality Assessment

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## Abstract---

**Background/Objectives:** The purpose of this study is to determine perceived parental acceptance-rejection, depression, and personality assessment of junior high school students.

**Methods/Statistical analysis:** As a descriptive correlation study, data was collected from 145 students. Data was analyzed using independent t-test, One-way ANOVA, and Pearson's correlation coefficients.

**Findings:** As subjects' recognized parental acceptance-rejection, depression, and personality assessment were analyzed, it turned out that the average value of motherly acceptance-rejection value was  $90.93 \pm 8.58$  points and that of fatherly acceptance-rejection value was  $81.89 \pm 8.15$  points respectively. The level of two sub-items—hostility and indifference—was high in both parents. The average value of depression was  $19.50 \pm 4.85$  points, and that of personality assessment (PAQ) was  $107.26 \pm 10.81$  points. The figure was high in order of aggression and negative self-adequacy, and that of dependency was the lowest. Subjects' character assessment was in a medium level of positive correlation with parental acceptance-rejection (Mother,  $r=.40$ ,  $p<.001$ ), (Father,  $r=.44$ ,  $p<.001$ ) and in a negative correlation with depression ( $r=-.39$ ,  $p<.001$ ). Parental acceptance-rejection was in a negative correlation with depression ( $r=-.22$ ,  $p=.007$ ), ( $r=-.24$ ,  $p=.003$ ), and the mother's parenting attitude was in close positive correlation with the father's parenting attitude ( $r=.78$ ,  $p<.001$ ).

**Improvements/Applications:** This study suggests the necessity of proactive counseling and nursing intervention programs for junior high-school students in order to promote their healthy mental development in their early adolescent period.

**Keywords---** Parents, Attitude, Depression, Adolescent, Personality.

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## I. INTRODUCTION

Recently, society has gone through global economic crises, excessive ardor for academic pursuits, and rapid changes in family forms, etc. Such changes bring crises into families such as conflicts with the spouse, parental acceptance-rejection, and so forth. As such matters affect children, young ones are likely to face emotional problems such as depression, aggression, hyperactivity, negative personality, etc., resulting in negative influence on their relationships with breeders, companions, and classmates at school. Middle school students are in their adolescent years and go through a period of transition to adulthood with much confusion in the face of drastic physical changes and development tasks to be achieved. Besides, this period involves significant emotional and behavioristic changes as well as serious internal stress as well as challenges in relationships, which result in various problems regarding emotions and behaviors<sup>1</sup>.

As the time of adolescence comes earlier than before recently, the number of middle school students who walk out on school education due to their behavioristic problems and misconducts is increasing<sup>2</sup>. Parental acceptance-rejection that takes place through parent-child interactions affect the development of emotional behaviors and personalities of the child in the created emotional atmosphere of the family. Particularly, parents' negative rearing behaviors are likely to result in personality problems or negative behaviors<sup>3</sup>. Parental acceptance-rejection means parents' emotional and psychological attitudes and behaviors that parents show in rearing children, affecting children's characteristics, attitudes, and value systems in the family<sup>4</sup>.

Parental acceptance-rejection is affected by various environmental factors such as family atmosphere and social status, personal elements of parents or children, and so forth. It is a deciding factor when it comes to the quality of parent-child relationships as well as the development of linguistic, intellectual, emotional, social, and character traits of children<sup>5</sup>. In addition, it has been reported that parental acceptance-rejection is in close relation with dispositions and personalities of children and is a causal factor of depression<sup>6</sup>. In their study conducted among middle school students, Kim and Min<sup>7</sup> reported that parental acceptance-rejection is in close relation, directly or indirectly, with children's dispositions, and that it affects children's depression and personalities. In a survey conducted among middle school students, Muris<sup>8</sup> asserted that harmful parental acceptance-rejection is relevant to children's maladjustment as well as psychopathologic symptoms including anxiety, depression, negative and disruptive behaviors, etc. Depression among youths is a hidden type of unpleasant feelings and often displayed with resistant and negative behaviors in every matter. It is reported that depression leads to maladaptation and problematic behaviors in family and school life and is in close relation with emotional disturbance in adulthood as well<sup>9</sup>. Moreover, Youths' depression can be so impulsive and disturb self-regulation so much that it can even lead to suicide. As such, its seriousness is a big issue in society<sup>10</sup>. Depression also affects personality formation in childhood, leading to maladaptation and problematic behaviors in family and school life as well as drastic deterioration of the quality of life. When neglected, developed negative traits of the personality increase the risk of serious results such as suicide. Hence, more keen attention needs to be paid to this issue<sup>11</sup>.

Most existing researches on this issue, however, focus on maternal relationships and rearing attitudes. There have been few studies on the specific effects of parental individual rearing attitudes or parental acceptance-rejection including fatherly acceptance-rejection on middle school students. As structural and functional aspects of family life change in line with higher rates of mothers' employment, the trend toward the nuclear family, scientific development in life, fathers' roles and weight have increased in raising children, which had been mainly taken care of by mothers. Accordingly, it is necessary to examine the effect of parental acceptance-rejection on children. In order to classify and measure parental acceptance-rejection that children recognize and thus to grasp the extent that this element affects the development of negative personalities among middle school students, this study investigates the relevance between general characteristics of middle school students and recognized acceptance-rejection of their fathers and mothers, depression, and personalities. It is expected that the findings of this study can be utilized as a basis for nursing intervention programs.

## II. RESEARCH METHOD

### A. Research Design

This is a correlation study that examines the relevance between general characteristics of middle school students and their recognized acceptance-rejection attitudes of parents, depression, and personality.

## **B. Data Collection**

As for the study subjects, the appropriate number of samples was estimated by means of G\*Power 3.7. Program: The significance level was .05, the median effect size was .25, and testing power (1- $\beta$ ) was 0.8. The estimated number was 107, but in consideration of the limitation that the survey was conducted in a middle school of coeducation located in Seoul, the students in the 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> grades, totaling to 550, were selected for this survey. Among them, those who understood the purpose of this study, agreed to participate in this study, and obtained approvals of their parents and homeroom teachers, totaling to 155, who participated in the final analysis.

For data collection, the study objective was explained through a health teacher at one middle school located in Seoul in July 2013. After the initial agreement on survey participation, the researcher of this study visited the school and explained the study objective and survey procedures personally to the homeroom teacher and obtained the second agreement.

The homeroom teacher then explained the study objective to the students, distributed the questionnaires, and asked them to complete them. Among 155 participants, 145 were selected in the final analysis except the 10 whose responses were insufficient. The response rate was 95.5%.

## **C. Measurements**

### **Parental Acceptance-Rejection (PARQ)**

The PARQ (Parental Acceptance-Rejection Questionnaire) designed by Rohner<sup>12</sup> to measure parental acceptance-rejection was modified and used in this study. This is a self-reporting questionnaire to measure subjects' experience of parental affection according to acceptance-rejection scales in 4 aspects which are divided mainly into 2 areas of acceptance and rejection: Aspects of warmth/affection indicate acceptance while three aspects of aggression/hostility, neglection/indifference, and vague rejection (undistinguishable) indicate rejection. The 4-point Likert scale was used to measure responses to each question. The range of the total score was from 24 to 96 points. When the total score exceeded 60, it indicates that rejection was dominant over acceptance.

### **Depression**

To grasp the level of depression among middle school students, 'The Center for Epidemiologic Studies Depression Scale (CES-D)', which was developed by the National Institute of Mental Health (NIMH) of the U.S. for epidemiological survey, was translated by Cho and Kim<sup>13</sup>, and the Korean version of the CES-D whose reliability and validity were verified was used in this study. The CES-D consists of 20 items including feeling of depression, guiltiness, feeling of worthlessness, lethargy, frustration, loss of appetite, sleep disorder, etc. 16 or higher points indicate a measure of depression. The value of Cronbach's alpha that indicated the reliability of this study was .727.

### **Personality**

Personalities of middle school students were measured by means of the PAQ (Personality Assessment Questionnaire), a self-reporting questionnaire developed by Rohner and Khaleque<sup>14</sup>. The PAQ consists of the following sub-areas: Hostility & Aggression, Dependency, Negative self-esteem, Negative self-adequacy, Emotional unresponsive, Emotional instability, and Negative world view. Items are measured in the 4-point scale. The higher score, the higher level of maladaptation. The value of Cronbach's alpha which indicates the reliability of this study is .735.

## **D. Data Analyses**

Subjects' characteristics were analyzed based on the frequency, percentage, average, and standard deviation. The difference in characteristics among the subjects was analyzed by means of t-tests, and Scheffe method was also utilized for follow-up analysis and one-way ANOVA. Subjects' parental acceptance-rejection, depression, and personality assessment were analyzed based on the average and standard deviation.

The correlation among parental acceptance-rejection, depression, and personality assessment were analyzed based on Pearson's correlation coefficient. Regression analysis was conducted to examine factors that would affect personality assessment.

**E. Ethical Considerations**

Prior to distributing the questionnaire, it was informed that responses to the survey would be used only for the purpose of research, and it was not forced to expose their personal information. It was also informed that they could stop anytime as they wanted.

Since this was a survey conducted among students in a certain region, careful consideration is required for the generalization of its findings.

**III. RESULTS**

**A. Participant Characteristics**

As for sex, the number of male youths was 83(57.2%), and that of female youths 62(42.8%) respectively. The average age was 13.67(range: 12 to 15), and 85 individuals were in their 2<sup>nd</sup> grade (58.6%). 98 (67.6%), the largest portion, had one sibling in their family. As for their school records, 67 of them were in the upper 30%(46.2%). 81(55.9%) had a religion. Most of them were in a nuclear family (89.7%), and 126 individuals were living with both parents(86.9%). 78 stated that only one of their parents was working(53.8%). 140 stated that their fathers (96.6%) had a job while 69 (47.6%) stated that their mothers had a job. 103 of them stated that their fathers were college graduates (71.0%), and 80 (55.1%) stated that their mothers were college graduates.80 stated that the monthly income of their families was 2 million to 4 million won(55.2%) as shown in table 1.

Table 1: Characteristics of the Participants (N=145)

Characteristics		N (%)
Gender	Male	83(57.2)
	Female	62(42.8)
Grade	1 <sup>st</sup> GradeinMiddleSchool	31(21.4)
	2 <sup>nd</sup> GradeinMiddleSchool	85(58.6)
	3 <sup>rd</sup> GradeinMiddleSchool	29(20.0)
Siblings	None	26(17.9)
	One	98(67.6)
	Two or more	21(24.5)
Religion*	Yes	81(55.9)
	No	64(44.1)
Family Type	Big Family	15(10.3)
	Nuclear Family	130(89.7)
Rank in School	Top 30%	67(46.2)
	Above 70%	41(28.3)
	Below 70%	37(25.5)
Living with Parents	Mother only	11(7.6)
	Father only	7(4.8)
	Both Parents	126(86.9)
	None	1(0.7)
Parents Working	Both Parents	67(46.2)
	One Parent	78(53.8)
Working Father	No	5(3.4)
	Yes	140(96.6)
Working Mother	No	76(52.4)
	Yes	69(47.6)
Mother's Education Level	High school or Below	63(43.4)
	College and above	80(55.1)
Father's Education Level	High school or Below	42(29.0)
	College and above	103(71.0)
Monthly Family Income	Less than 2,000,000 won	14(9.7)
	From 2,000,000 To 4,000,000 won	80(55.2)
	More than 4,000,000 won	51(35.2)

**B. Parental Acceptance-rejection(PARQ), Depression, and Personality Assessment (PAQ) of Subjects**

As subjects' recognized parental acceptance-rejection, depression, and personality assessment were analyzed, it turned out that the average value of motherly acceptance-rejection value was 90.93±8.58points and that of fatherly acceptance-rejection value was 81.89±8.15points respectively. The level of two sub-items – hostility and indifference – was high in both parents. The average value of depression was 19.50±4.85

points, and that of personality assessment (PAQ) was 107.26±10.81 points. The figure was high in order of aggression and negative self-adequacy, and that of dependency was the lowest as shown in table 2.

Table 2: Personality Assessment (PAQ), Depression, Parental Acceptance-rejection(PARQ)(N=145)

Variables	Total (n=145)	
	Mean±SD	Range
Mother's acceptance-rejection	90.93±8.58	
Warmth/Affection	14.70±5.51	
Hostility/Aggression	19.83±3.14	
Indifference/Neglect	19.27±2.27	
Undifferentiated rejection	14.77±1.97	
Control	12.37±2.45	
Father's acceptance-rejection	81.89±8.15	
Warmth/Affection	15.46±5.57	
Hostility/Aggression	20.01±3.02	
Indifference/Neglect	19.06±2.31	
Undifferentiated rejection	14.66±2.01	
Control	12.70±2.34	
Depression	19.50±4.85	10-36
Personality Assessment Questionnaire	107.26±10.81	42~168
Aggression	18.68±3.32	6~42
Dependence	12.43±3.03	6~42
Negative self-esteem	15.61±1.92	6~42
Negative self-adequacy	16.17±1.86	6~42
Emotional unresponsiveness	13.51±2.41	6~42
Emotional instability	15.76±3.13	6~42
Negative world view	15.12±2.33	6~42

**C. Correlation among Recognized Parental Acceptance-rejection, Depression, and Personality Assessment (PAQ)**

Subjects' character assessment was in a medium level of positive correlation with parental acceptance-rejection (Mother,  $r=.40, p<.001$ ), (Father,  $r=.44, p<.001$ ) and in a negative correlation with depression ( $r=-.39, p<.001$ ). Parental acceptance-rejection was in a negative correlation with depression ( $r=-.22, p=.007$ ), ( $r=-.24, p=.003$ ), and the mother's parenting attitude was in close positive correlation with the father's parenting attitude( $r=.78, p<.001$ ) as shown in table 3.

Table 3: Correlation among Perceived Parenting Acceptance-rejection, Depression and Personality Assessment

Variables	Depression	Mother's acceptance-rejection	Father' acceptance-rejection
	r(p)	r(p)	r(p)
Personality Assessment	-.39(<.001)	.40(<.001)	.44(<.001)
Depression		-.22(.007)	-.34(.015)
Mother's acceptance-rejection			.78(<.001)

**IV. DISCUSSION**

This study aims to grasp the correlation between depression, parental acceptance-rejection, and personality assessment among students in one middle school and thereby to provide a basis for intervention programs aiming at youths.

Middle school students go through an important step in their lives during which drastic physical, psychological, and social developments take place. In this period of life, the risk of various psychopathologic diseases and rates of suicide attempts also increase<sup>15</sup>. Particularly, suicide rates in Korea are the highest among OECD members, and the top cause of death among youths in Korea is suicide. These statistics well imply that mental health of domestic middle school students is unstable<sup>16</sup>. Major factors that may affect such unstable mental conditions of middle school students include stress due to academic matters such as competitive entrance examination system, relationship with friends, school violence, and parental acceptance-rejection<sup>17,18</sup>.

This study adopts the CES-D to measure the level of depression, which is judged on the basis of the 16-point scale<sup>19</sup>. It turned out that the extent of depression recognized by subjects in this study was 19.5 points,

which indicates that they are suffering from depression. This level is higher than that measured among patients with stomach cancer<sup>20</sup>, and this result supports the statistical report of the Ministry of Health and Welfare that depression experiences and suicidal impulses are gradually increasing among domestic middle school students<sup>21</sup>. According to one research on depression factors of middle school students<sup>22,23</sup>, depression is highly relevant to relationships with parents, siblings, friends, etc., and particularly, parental acceptance-rejection is the most significant factor that affects mental health of middle school students<sup>24</sup>. As for parental acceptance-rejection recognized by subjects of this study, it turned out that they recognized negative parenting attitudes of rejection rather than acceptance from both fathers and mothers. The level of rejection from mothers was recognized as higher than that from fathers. As for sub-items such as warmth/affection, aggression/hostility, neglect/indifference, and vague(undistinguishable) rejection, it turned out that the parenting attitude of aggression/hostility was the most significant. While the total score of motherly rejection was relatively high, the attitudes of aggression/hostility were more significant among fathers. Such parenting attitudes of rejection among parents affect psychological maladjustment among youths most significantly, and such attitudes even affect psychological adaptation not only in childhood but also in adulthood. It is reported that in Korea, such parental attitudes are related to the fixed roles of fathers and mothers in the past patriarchal order<sup>25</sup>. The generation born and brought up in the 1960 to 1980s tends to be authoritative and distinguish roles of a mother and those of a father clearly. While the parenting attitude of rejection of the father affects the children's psychological maladjustment more than that of the mother<sup>26</sup>, children's psychological well-being is more affected by the parenting attitude of the mother than that of the father according to researches<sup>27</sup>.

Thus, the government should provide early screening of the negative emotions such as depression<sup>28,29</sup> nursing intervention programs aiming at youths need to be developed in consideration of parental acceptance-rejection and in association with education programs for parents who have young children.

## V. CONCLUSION

This study aims to provide a basis for intervention programs for depression among youths and to grasp the effect of parental acceptance-rejection on their emotions. The mean score of depression, mother's parenting attitude, and father's parenting attitude of adolescents was  $19.50 \pm 4.85$ ,  $90.93 \pm 8.58$ , and  $81.89 \pm 8.15$ , respectively. Parenting attitude negative correlation with depression ( $r = -.22$ ,  $p = .007$  /  $r = -.34$ ,  $p = .015$ ), and mother's parenting attitude positive correlation with father's parenting attitude ( $r = .78$ ,  $p < .001$ ).

According to the findings of this study, youths' personality assessment is in relation to parental acceptance-rejection, and positive personality assessment has positive effect on depression. In addition, it turned out that when the parental acceptance-rejection attitude was positive, the extent of depression in the affected youth was low. As intervention programs for youths need to be developed and applied actively, it is desirable to include interactions with parents and parental acceptance-rejection as major components in such programs.

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## A Study on Intention to Use Mobile Convenient Payment Service according to Individual's Tendency of Regulatory Focus and Gender

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### Abstract---

**Background/Objectives:** This study desires to induce both academic and practical suggestions by investigating the impact of user's regulatory focus tendency and gender on the amount paid through the mobile convenient payment service.

**Methods/Statistical analysis:** This study would like to investigate how does the intention to use mobile convenient payment service change according to the tendency of individual's regulatory focus and gender in paying a high value over 100,000 Won (approx. 100 USD) and a low value less than several tens of thousands Won (approx. several tens of USD). In addition, Two-way MANOVA was used in the experiment in order to identify the interaction effect between the tendency of individual's regulatory focus and gender in the intention to use mobile convenient payment service in paying a high value and low value.

**Findings:** As a result of research, the intention to use mobile payment service in paying a high value was appeared to have no interaction in the aspect of interaction effect between the tendency of individual's regulatory focus and gender. However, the intention to use mobile payment service in paying a low value was appeared to have interaction in the aspect of interaction effect between the tendency of individual's regulatory focus and gender.

**Improvements/Applications:** In result, this research shows that the female who has the tendency of prevention focus selects very reasonably in the use of mobile payment service. That is, they select the advantage of the convenience than the negative factors such as security risk in paying a low value but do not use the mobile payment service putting more significance to the negative factor such as security issue instead of the advantage of convenience in paying a high value.

**Keywords---** Mobile Payment, Fintech, Regulatory Focus, Gender, MANOVA, UTAUT.

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## I. INTRODUCTION

Recently, the mobile convenient payment service has quickly increased the market size and expands its range to the offline over the online. According to the estimation of a US market survey company, the payment market using mobile shall increase by average 35% every year from 163.1 billion USD in 2012 to 721.4 billion USD in 2017 with 450 million users over the world<sup>1</sup>. In parallel with the growth of this mobile market, the payment method in the mobile commerce environment also quickly evolves through emergence of various mobile convenient payment services.

Actually, the representing mobile convenient payment services including Ali-Pay of China, Pay-Pal and Apply-Pay of USA and Samsung-Pay of Korea are creating the user group and awareness very solidly over the world while other services such as Kakao-Pay and Naver-Pay are increasing the market very actively in the local market of Korea.

However, the success of these mobile convenient payment services is significantly contrasted with the traffic card since the traffic card is operated with the contactless method same like NFC (Near Field Communication) of the mobile convenient payment service but could secure its application range only in an extremely limited range such as convenience store and cafeteria as a payment means though it used an effort continuously as an advanced electronic payment means with its convenience in use<sup>2</sup>.

Unlike the existing payment services, many studies have been actively carried out on the intention to use and vitalization of service as the positive assessment has been given to the mobile convenient payment service. However, the studies on the mobile convenient payment service have been carried out mainly based on the security performance or TAM or UTAUT model that the technical factors adding the properties such as the risk, usefulness and reliability have been studied<sup>3,4</sup>.

In this context, the researcher would like to study in viewpoint of user's characteristics which have been relatively less studied rather than technical characteristics of the mobile convenient payment service on which many studies have been carried out. In detail, this study desires to induce both academic and practical suggestions by investigating the impact of user's regulatory focus tendency and gender on the amount paid through the mobile convenient payment service.

## II. LITERATURE REVIEW

### A. *Intention to Use the Mobile Convenient Payment Service*

The mobile convenient payment system refers to a means which assists the user to pay easily for the goods or service via wireless communication using a mobile device such as Smart phone<sup>4,5,6</sup>.

Pham & Ho<sup>7</sup> established the fact that the personal factor such as an ability to absorb the service functions on the intention to accept the mobile convenient payment service and Augsburg & Hermann<sup>8</sup> claimed that the perceived usefulness, suitability and convenience influence on the use of mobile convenient payment service. In addition, Kang SH<sup>9</sup> claimed that the mobile convenient payment service is more suitable to the low value payment than the high value payment.

Similarly, many studies claim that the personal factors like perceived usefulness and an ability to absorb the service function on the use of the mobile convenient payment service and also claim that the intention to use the mobile convenient payment service is higher for low value payment than high value payment with the reason of security issue etc.

### B. *Regulatory Focus*

Higgins<sup>10</sup> reported the regulatory focus theory which classifies the tendencies of the people to the promotion focus and prevention focus assuming that the people, in general, have a motive to pursue the pleasure and avoid the pain. The promotion focus means a tendency to stress the desire and accomplishment and give priority to positive performance achievement while the prevention focus means a tendency to worry about the responsibility and safety and give priority to prevention of negative result<sup>11</sup>.

Therefore, the people who have the promotion focus have a tendency to take the risk and those who have the prevention focus have a tendency to avoid the risk<sup>12,13</sup>. Many subsequent theories have been carried out on the regulatory focus theory combined with the studies in various fields. Especially, the regulatory focus theory has been very actively studied in psychology and marketing fields.

For example, Crowe & Higgins<sup>14</sup> claimed that the people assess the goods differently according to tendency of the regulatory focus and Kim YD<sup>15</sup> claimed that the consumers have different emotions according to self-regulation directivity when they invest in the financial instrument.

**C. Difference by Gender**

Market classification strategy by gender is one of the most basic modern marketing strategies and the information for the difference between the male and female is a means to access the consumers with more sophisticated and segmentalized method<sup>16</sup>.

Many previous studies showed that there is a difference in purchasing the goods or other consumption acts according to the gender, the male and female. Rodgers & Harris<sup>17</sup> and Gabarino & Strahilevitz<sup>18</sup> identified the different properties in the male and female through the studies on the online shopping behavior and purchase intent according to the gender. Especially Kim KH & You YY & Baek SJ<sup>19</sup> claimed that there was a difference in the nervousness among Big-5 personality traits between males and females. In addition, they identified that neuroticism correlates positively with the intention to use of mobile convenient payment services.

**III. RESEARCH MODEL AND HYPOTHESIS**

**A. Experimental Design and Research Model**

This study organized following research model (Figure 1) in order to find the difference in the intention to use of the mobile convenient payment service according to the regulatory focus and gender.

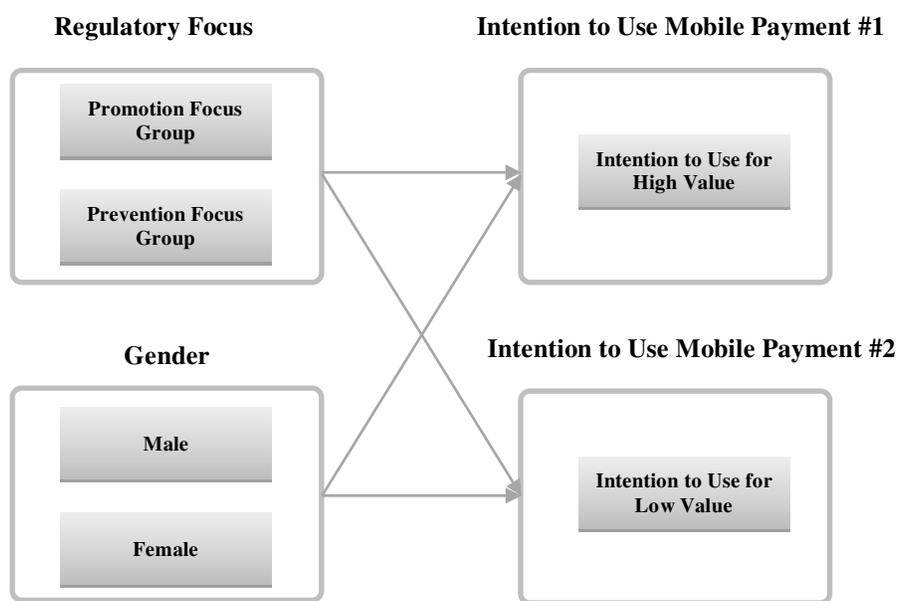


Figure 1: Research Model

**B. Manipulative Definition of Variable**

**a. Regulatory Focus**

The regulatory focus used in this study was measured with Likert Scaling 7 using the regulatory focus questionnaires developed by Lockwood & Kunda<sup>20</sup>. The questionnaires consist of 9 questions related to the promotion focus and 9 questions related to the prevention focus. However, this study used only 9 questions for the promotion focus out of total 18 questions since the previous studies proved that either the promotion focus or prevention focus could be used<sup>20,21</sup>. This study classified the regulatory focus to the promotion focus group which is higher than the median (Median = 5.125) and the prevention focus group which is lower than the median.

### ***b. Intention to Use Mobile Convenient Payment Services***

The intention to use mobile convenient payment service used a definition, 'Intent or plan to use the technology' generally used in TAM model. On the other hand, the intention to use mobile convenient payment service in high value payment means an intent or plan to use the same for high value over 100,000 Won (approx. 100 USD) while the intention to use mobile convenient payment service means an intent or plan to use the same for low value less than several tens of thousands Won (approx. several tens of USD).

### ***C. Hypothesis***

The hypotheses of the research were set as follows based on the theoretical backgrounds and manipulative definition of variable mentioned earlier:

H1: Intention to use mobile convenient payment service shall be different according to gender.

H1-1: Intention to use mobile convenient payment service shall be significantly different according to Gender in paying a high value.

H1-2: Intention to use mobile convenient payment service shall be significantly different according to Gender in paying a low value.

H2: Intention to use mobile convenient payment service shall be different according to the tendency of the regulatory focus.

H2-1: Intention to use mobile convenient payment service shall be significantly different according to the tendency of individual's regulatory focus in paying a high value

H2-2: Intention to use mobile convenient payment service shall be significantly different according to the tendency of individual's regulatory focus in paying a low value.

H3: Tendency of individual's regulatory focus and gender shall give an interaction effect to the intention to use mobile convenient payment service.

H3-1: Tendency of individual's regulatory focus and gender shall give an interaction effect to the intention to use mobile convenient payment service in paying a high value.

H3-2: Tendency of individual's regulatory focus and gender shall give an interaction effect to the intention to use mobile convenient payment service in paying a low value.

## **IV. RESEARCH METHOD AND RESULT**

### ***A. Overview***

This study would like to investigate how does the intention to use mobile convenient payment service change according to the tendency of individual's regulatory focus and gender in paying a high value over 100,000 Won (approx. 100 USD) and a low value less than several tens of thousands Won (approx. several tens of USD). In addition, Two-way multivariate analysis of variance (Two-way MANOVA) was used in the experiment in order to identify the interaction effect between the tendency of individual's regulatory focus and gender in the intention to use mobile convenient payment service in paying a high value and low value.

The tendency of individual's regulatory focus and gender were used as the independent variables of this research model respectively while the intention to use mobile convenient payment service in paying a high value and the same in low value was used as the dependent variables respectively.

### ***B. Data Collection***

The data have been collected through face to face, email and Smart phone interviews with the consumers randomly selected, who used to use or interested in use of the mobile convenient payment service from 1st May 2016 to 30th June 2016. Total 250 copies of questionnaires were distributed and 219 copies were collected. This study has been carried out through 207 copies except 12 copies which answered unfaithfully out of the questionnaires collected.

SPSS 22 for Windows program was used in data analysis. The demographic statistics analysis was verified using frequency analysis, the reliability and validity analysis for the measuring tool was verified using factor analysis, the internal consistency analysis was verified using Cronbach  $\alpha$  and the research hypothesis was verified using Two-Way MANOVA respectively.

### ***C. Demographic Characteristics***

Demographic characteristics of the sample are as follows: The gender consisted of the male by 59.4% and female by 40.6% and for the age, 20S and 30S took 39.6% and 35.7% respectively. The next was 40S by 12.6% and over 50S took 9.6% while 10S took 2.4%. Regarding the final education, the high school students or

graduates took 10.6%, the 2 year college students or graduates took 11.1%, 4 year college students or graduates took 66.7% and the graduate school students or graduates took 11.6% respectively. For the income level, the group less than 1 million Won took 27.1%, the highest percentage and the group over 2 million Won below 3 million Won took 23.7%, the group over 1 million Won below 2 million Won took 23.2%, the group over 3 million Won below 4 million Won took 15.5% and the group over 4 million Won took 10.6% respectively.

**D. Reliability and Validity Analysis**

Exploratory Factor Analysis was conducted for the regulatory focus, an independent variable and the intention to use mobile convenient payment service, a dependent variable used in this study respectively. Factor loading for all questions was checked through Principle Component Analysis. The questions whose promotion focus 8 (ProMF8) and prevention focus 9 (PreVF9) were proved to be less than 0.4 in communality were excluded and the factor loading was simplified using Varimax afterwards. All measurement variables used in this study through these procedures met the factor loading by higher than 4.0 and Eigen value by higher than 1.0 while KMO met higher than 0.8 and reliability coefficient (Cronbach’s  $\alpha$ ) was identified to be between .86 and .98 that they were confirmed to have internal consistency. The result of the factorial analysis and reliability analysis for the regulatory focus and the intention to use mobile convenient payment service could be checked through Table 1 and Table 2 respectively.

Table 1: Factorial Analysis and Reliability Analysis for Regulatory Focus

Index		Factor loading		Communality
		Prevention Focus	Promotion Focus	
Regulatory Focus	PreVF8	.76	-.11	.59
	PreVF6	.75	-.04	.57
	PreVF4	.75	.13	.58
	PreVF5	.74	.01	.55
	PreVF3	.74	.05	.55
	PreVF2	.73	.09	.53
	PreVF7	.64	-.19	.45
	PreVF1	.64	.01	.40
	ProMF3	.08	.77	.60
	ProMF4	.03	.74	.55
	ProMF6	-.07	.73	.53
	ProMF1	.05	.72	.52
	ProMF7	-.10	.72	.53
	ProMF2	.04	.71	.50
	ProMF9	-.19	.67	.49
	ProMF5	.10	.67	.46
Eigen value		4.2	4.1	
Variance(%)		26.4	26.1	
Cronbach Alpha		.87	.86.	
KMO		.83		

Table 2: Factorial Analysis and Reliability Analysis for Intention to Use

Index		Factor loading		Communality
		Intention to Use for High Value	Intention to Use for Low Value	
Intention to Use	INUFHV2	.92	.31	.95
	INUFHV3	.92	.33	.95
	INUFHV4	.91	.30	.92
	INUFHV1	.90	.32	.91
	INUFLV2	.25	.91	.89
	INUFLV3	.33	.90	.91
	INUFLV1	.28	.88	.85
	INUFLV4	.38	.84	.84
Eigen value		3.7	3.5	
Variance(%)		46.5	43.6	
Cronbach Alpha		.98	.95	
KMO		.89		

**E. Correlation Analysis for Dependent**

The result of the investigation which investigated the correlation between the intention to use mobile convenient payment service in paying a high value and the same in paying a low value, dependent variables of this study are as Table 3.

Table 3: Correlation Analysis

Index		Intention to Use for High Value	Intention to Use for Low Value
Intention to Use for High Value	Pearson Correlation	1	.622**
	Sig. (2-tailed)		.000
	N	207	207
Intention to Use for Low Value	Pearson Correlation	.622**	1
	Sig. (2-tailed)	.000	
	N	207	207

\*\* p<.01

As shown on Table 3, the positive (+) correlation between the intention to use mobile convenient payment service in paying a high value and the same in paying a low value was significantly appeared. Further, additional MANOVA analysis was conducted in order to investigate each dependent variable more intensively.

**F. Two-Way MANOVA Analysis**

Hypothesis verification was conducted through 2x2 dispersion analysis using the tendency of individual's regulatory focus and gender as independent variables and the intention to use mobile convenient payment service in paying a high value and low value as dependent variables. First, the descriptive statistics quantity of each variable is as Table 4.

Table 4: Descriptive Statistics

Intention to Use Reg. Focus	Gender		Mean	Std. Deviation	N
Intention to Use for High Value	Prevention Focus	Males	4.1	1.5	60
		Females	3.6	1.6	38
		Total	3.9	1.6	98
	Promotion Focus	Males	4.7	1.9	63
		Females	4.1	2.0	46
		Total	4.4	2.0	109
	Total	Males	4.4	1.8	123
		Females	3.9	1.8	84
		Total	4.2	1.8	207
Intention to Use for Low Value	Prevention Focus	Males	4.6	1.5	60
		Females	5.0	1.5	38
		Total	4.8	1.5	98
	Promotion Focus	Males	5.8	1.4	63
		Females	5.1	1.8	46
		Total	5.5	1.6	109
	Total	Males	5.2	1.6	123
		Females	5.0	1.7	84
		Total	5.2	1.6	207

Second, Box M analysis was carried out for Test of Equality of Covariance Matrices of independent variables and the result showed that p-value = .126 as shown on Table 5, which identified the covariance matrices were same.

Table 5: Box's Test of Equality of Covariance Matrices

Box'M	F	df1	df2	p
14.162	1.544	9	267593.981	.126

Third, Multivariate Test of Dependent Variables was conducted and the result showed that the interaction effect between the two independent variables significantly appeared in all 4 statistics quantities as presented in Table 6 (F>3.114, p<.05). That is, the intention to use mobile convenient payment service in paying a high value and the one in paying a low value are different each other.

Table 6: Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.915	1092.413	2.000	202.000	.000	.915
	Wilks's Lambda	.085	1092.413	2.000	202.000	.000	.915
	Hotelling's Trace	10.816	1092.413	2.000	202.000	.000	.915
	Roy's Largest Root	10.816	1092.413	2.000	202.000	.000	.915
Regulatory Focus (A)	Pillai's Trace	.035	3.698	2.000	202.000	.026	.035
	Wilks's Lambda	.965	3.698	2.000	202.000	.026	.035
	Hotelling's Trace	.037	3.698	2.000	202.000	.026	.035
	Roy's Largest Root	.037	3.698	2.000	202.000	.026	.035
Gender (B)	Pillai's Trace	.030	3.114	2.000	202.000	.047	.030
	Wilks's Lambda	.970	3.114	2.000	202.000	.047	.030
	Hotelling's Trace	.031	3.114	2.000	202.000	.047	.030
	Roy's Largest Root	.031	3.114	2.000	202.000	.047	.030
A * B	Pillai's Trace	.042	4.457	2.000	202.000	.013	.042
	Wilks's Lambda	.958	4.457	2.000	202.000	.013	.042
	Hotelling's Trace	.044	4.457	2.000	202.000	.013	.042
	Roy's Largest Root	.044	4.457	2.000	202.000	.013	.042

Lastly, the differences between the variables were verified in more detail through Tests of Between-Subjects Effects (Table 7).

Table 7: Tests of Between-Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Intention to Use for High Value	32.166 <sup>a</sup>	3	10.722	3.401	.019	.048
	Intention to Use for Low Value	42.283 <sup>b</sup>	3	14.094	5.855	.001	.080
Intercept	Intention to Use for High Value	3386.765	1	3386.765	1074.153	.000	.841
	Intention to Use for Low Value	5220.482	1	5220.482	2168.704	.000	.914
Regulatory Focus (A)	Intention to Use for High Value	13.619	1	13.619	4.319	.039	.021
	Intention to Use for Low Value	17.161	1	17.161	7.129	.008	.034
Gender (B)	Intention to Use for High Value	17.540	1	17.540	5.563	.019	.027
	Intention to Use for Low Value	1.526	1	1.526	.634	.427	.003
A * B	Intention to Use for High Value	.328	1	.328	.104	.747	.001
	Intention to Use for Low Value	15.564	1	15.564	6.466	.012	.031
Error	Intention to Use for High Value	640.051	203	3.153			
	Intention to Use for Low Value	488.659	203	2.407			
Total	Intention to Use for High Value	4322.438	207				
	Intention to Use for Low Value	6028.313	207				
Corrected Total	Intention to Use for High Value	672.217	206				
	Intention to Use for Low Value	530.943	206				

Following facts were found through Tests of Between-Subjects Effects of Table 7:

- The intention to use mobile convenient payment service in paying a high value is different according to individual's gender (F=5.56, p<.05)
- The intention to use mobile convenient payment service in paying a low value is not different according to individual's gender (F=.63, p=.75).
- The intention to use mobile convenient payment service in paying a high value is different according to the tendency of individual's regulatory focus (F=4.32, p<.05).
- The intention to use mobile convenient payment service in paying a low value is different according to the tendency of individual's regulatory focus (F=7.13, p<.05)

- The tendency of individual's regulatory focus and gender has no interaction effect in paying a high value using mobile convenient payment service ( $F=.10, p=.75$ )
- The tendency of individual's regulatory focus and gender has interaction effect in paying a low value using mobile convenient payment service ( $F=6.5, p<.05$ )

Below Figure 2 and Figure 3 represent the effect of the intention to use mobile convenient payment service in paying a high value and low value respectively. In paying a high value, it is found that the male has higher tendency to pay than the female regardless of tendency of the regulatory focus. However, the promotion focus group shows a similar pattern to that of the high value payment but the intention to use mobile convenient payment service of the group having prevention focus out of females is higher than that of the males having prevention focus in paying a low value.

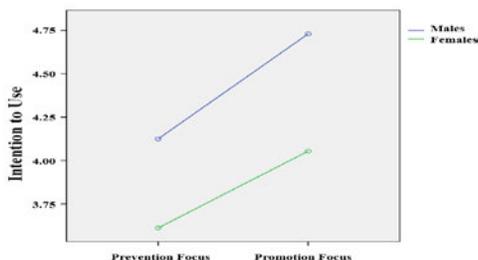


Figure 2 : Intention to Use for High Value

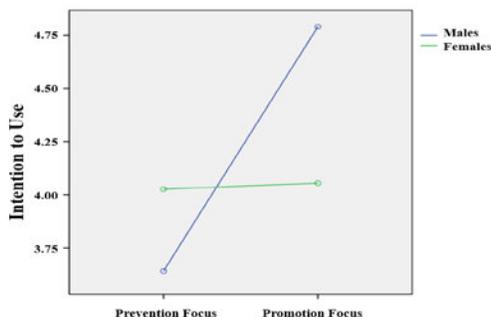


Figure 3 : Intention to Use for Low Value

### G. Verification of Hypotheses

The verification result of each hypothesis analyzed through various statistical analysis procedures carried out till now is as follows (Table 8).

Table 8: Verification of Hypotheses

Hypotheses	Result
H1: Intention to use mobile convenient payment service shall be different according to gender.	
H1-1: Intention to use mobile convenient payment service shall be significantly different according to gender in paying a high value.	Supported
H1-2: Intention to use mobile convenient payment service shall be significantly different according to gender in paying a low value.	Rejected
H2: Intention to use mobile convenient payment service shall be different according to the tendency of the regulatory focus.	
H2-1: Intention to use mobile convenient payment service shall be significantly different according to the tendency of individual's regulatory focus in paying a high value	Supported
H2-2: Intention to use mobile convenient payment service shall be significantly different according to the tendency of individual's regulatory focus in paying a low value.	Rejected
H3: Tendency of individual's regulatory focus and gender shall give an interaction effect to the intention to use mobile convenient payment service.	
H3-1: Tendency of individual's regulatory focus and gender shall give an interaction effect to the intention to use mobile convenient payment service in paying a high value.	Rejected
H3-2: Tendency of individual's regulatory focus and gender shall give an interaction effect to the intention to use mobile convenient payment service in paying a low value.	Supported

## V. CONCLUSION

This study investigated the relation if the tendency of individual's regulatory focus and gender in paying high value and low value give a significant effect and also investigated if the tendency of individual's regulatory focus and gender in paying high value and low value correlate each other.

As a result of research, the intention to use mobile convenient payment service was identified to be significantly different according to gender and the difference according to the tendency of individual's regulatory focus was also identified to be significant.

In addition, the intention to use mobile convenient payment service in paying a low value was identified to be significantly different according to the tendency of individual's regulatory focus but the difference according to gender was identified not to be significant.

On the other hand, the intention to use mobile convenient payment service in paying a high value was appeared to have no interaction in the aspect of interaction effect between the tendency of individual's regulatory focus and gender. However, the intention to use mobile convenient payment service in paying a low value was appeared to have interaction in the aspect of interaction effect between the tendency of individual's regulatory focus and gender.

Following conclusion could be made through this research:

First, the intention to use mobile convenient payment service is higher in paying a low value than that of paying a high value for both male and female.

Second, the male has higher intention to use mobile convenient payment service than that of female in paying a high value.

Third, there is no difference between male and female in the intention to use mobile convenient payment service in paying a low value.

Fourth, the female who has the tendency of prevention focus has higher intention to use mobile convenient payment service than that of the male who has the tendency of prevention focus.

In result, this research shows that the female who has the tendency of prevention focus selects very reasonably in the use of mobile convenient payment service. That is, they select the advantage of the convenience than the negative factors such as security risk in paying a low value but do not use the mobile convenient payment service putting more significance to the negative factor such as security issue instead of the advantage of convenience in paying a high value.

Finding the interaction effect between the gender and tendency of regulatory focus has a significant meaning in academic aspect. For example, it needs to investigate what difference in characteristics between the male and female brought this result in spite of the same tendency of the prevention focus through the subsequent study. In addition, what characteristics out of those of the mobile convenient payment service made a difference in selection between the male and female would be also a meaningful subject of the study.

Further, the result of this research is expected to be applied to the practice in great usefulness. Introduction of mobile convenient payment service shall function as a positive factor in terms of increasing sales for online and offline stores which mainly handle the goods with low prices less than several tens of thousands Won. Especially the stores which the female mainly use are expected to have bigger effect. In addition, it needs to provide active marketing activities with the males who have the tendency of prevention focus, the group which has the lowest intention to use mobile convenient payment service in terms of marketing of the enterprise. However, notwithstanding such academic and practical research performance, this research has following limits:

First, this research is carried out with the Korean people only while the mobile convenient payment service market is increasing over the world that it is difficult to represent the global environment.

Second, the number of samples per group is not sufficient since only 200 persons were classified to 4 groups by gender and type of characteristics in this research. Bigger number of samples shall be used in the subsequent study in order to enhance the representativeness of the samples and reliability of the research. The researcher wants the subsequent study to be an in-depth study in various fields considering the results and limits of this study collectively.

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# The Effects of Simulation-Based Learning on Nursing Students (Focusing on Self-Directed Learning Ability and Problem-Solving Competency)

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## Abstract---

**Background/Objectives:** This study was conducted to identify the effects of simulation-based learning on self-directed learning and problem-solving competency among nursing students in Korea.

**Methods/Statistical analysis:** Basic data was collected to help improve the simulation-based learning, skills, and performance of nursing students. The data was collected from September to December 2013 and was analyzed using the SPSS 18.0 program which uses descriptive statistics and paired t-tests. The research subjects were 42 undergraduate nursing students. The results showed an average self-directed learning score of  $2.66 \pm 0.30$  points before the experiment and  $2.86 \pm 0.45$  points after the experiment.

**Findings:** There was a statistically significant improvement in self-directed learning ( $t=2.728$ ,  $p=.009$ ). There was not a significant improvement in problem-solving competency. Therefore, the development of a program for self-directed learning is required to increase the effects of simulation-based learning.

**Improvements/Applications:** Simulation-based learning is regarded as an effective learning method for improving self-directed learning attitudes among nursing students

**Keywords---** Simulation Learning, Self-directed Learning, Problem-solving Competence, Nursing Student.

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## I. INTRODUCTION

In today's healthcare environment, nursing is a profession that requires professional knowledge and skills; such knowledge and skills are the factors that extend the professional lives of nurses.<sup>1</sup>The basis of nursing science is clinical performance based on expert knowledge. In order for students to be able to correctly assess patients and perform effective management, educational institutions should provide nursing students with training opportunities for clinical practice.<sup>2</sup>However, due to the strengthening of patients' rights and security in today's healthcare environment, nursing college students mainly have to learn by observation rather than by actual nursing practice.<sup>3</sup>Therefore, it is difficult for nursing college students to strengthen their professional knowledge, nursing skill achievement level, and critical thinking skills to the degree necessary by the time of their graduation.<sup>4</sup>

For these reasons, simulations have become a widespread method of learning in the nursing profession, and they have attracted international interest in recent years.<sup>5</sup>The studies on simulations vary from effectiveness studies to confidential and satisfaction studies that compare teaching methods and strategies.<sup>6</sup>Despite the fact that simulation-based learning is an effective learning method, differences can be seen among learners according to each learner's ability to actually perform the learning. Self-directed learning should precede simulation-based learning. To effectively and creatively respond to the rapidly changing healthcare environment, it is necessary for nursing students to cultivate the capacity for self-directed learning for their own continued professional growth.<sup>7</sup>

Self-directed learning refers to the process of adult learners taking the initiative to choose and apply appropriate learning strategies, diagnose their own learning needs, uncover potentially helpful human and material resources, and evaluate the results of their learning. It also refers to the personality characteristics related to that process.<sup>8</sup>Therefore, after graduation, nurses need to become self-directed learners and plan and execute a self-directed learning plan to effectively respond to the rapidly changing nursing practices in the clinical field and also to solve their informal, individualized problems.<sup>9</sup>

This study was conducted simulation based learning has attempted to identify impact on self-directed learning and problem solving competency.

## II. LITERATURE REVIEW

In the self-directed learning process, learners must control and be responsible for organizing their own learning. Self-directed learning provides students with the basic tools assess themselves and make learning decisions related to improving their professional knowledge. In addition, it can improve learners' self-confidence and their ability to ask questions.<sup>10</sup>Self-directed learning has been used for a long time as one of the teaching methods for nursing educators. It is needed to provide nursing students with the necessary knowledge and skills necessary for professional growth.<sup>11,12</sup>

Self-directed learning should precede simulation-based learning. In this context, this can be seen as an essential step. However, the recruitment of sufficient numbers of relatively expensive clinical teachers can be problematic. As students need to practice skills with increasingly distant supervision, self-directed learning known to be effective program in pre-clinical education.<sup>13</sup>Indeed, they have been shown to be effective in some specific areas such as surgery for cardiopulmonary resuscitation.<sup>14</sup>nursing students to participate in the simulation-based learning, they have experienced that familiar with vivid scenario while performing the scenario, and experience an increase in interest and motivation. Also they experience in specialist roles, greater confidence in their problem-solving skills and they experience accomplishment, development of insight for clinical situations.<sup>15</sup>Meanwhile, problem-solving ability is the ability to quickly and accurately evaluate clinical situations and come up with appropriate solutions.<sup>16</sup>Additionally, troubleshooting skills, which are based on constructivist beliefs, are skills that are actively engaged in learning situations such as cooperative learning, case study-based research, and decision-making and problem-solving scenarios.<sup>17</sup>Therefore, as has been argued in previous studies, simulation-based learning which gives nursing students the problem-solving skills needed to quickly and accurately find answers to, explanations for, or means of effectively dealing with patients' problems in an environment similar to real-world clinical situations will be important.

### **III. PROPOSED WORK**

#### **A. Materials and Methods**

##### **a. Design and Participants**

This research is an experimental study designed to focus on only one group. The study was designed to examine the effects of simulation-based learning on self-directed learning and problem-solving competency among nursing students. The data was collected via structural questionnaires completed by 42 nursing students studying at N university who agreed to participate in this study. The data used was collected according to the approved guidelines and screening procedures of "N" university located in Cheonan.

##### **b. Development of the Simulation Exercise Training Program**

- Scenarios developed for simulation study

The scenario developed for the study was as follows:

*You are a general surgical nurse, and you received a 60-year-old male patient "P" who returned to the room at 6:00 pm during the evening shift after THR OP. He was in a state of ABR after THR OP, and a Foley catheter, which was inserted during the preoperational time, was kept in that state. However, as soon as patient P comes into the room, he says, "I want to urinate, but I can't" and complains of pain in his lower abdomen area.*

*Currently, he has been given 1000 cc of 5% D/W.A total of 600cc was infused after 1:00pm, and there is approximately 100cc of urine in urine bag. However, you can't see the urine drainage in uro-tube, so you notify the doctor and decide to reinsert the Foley catheter. In order to solve this urination problem, what should you do? Please perform the correct nursing procedure. In this situation, Foley catheterization has been included in the process of solving this problem.*

##### **c. Development of Simulation based Learning Programs**

We created a scenario to simulate the symptoms and nursing issues of dysuria. Actual clinical cases based on the advice of an OS ward nurse's clinical experience at H Hospital located in Dongtan were referred to in order to create the scenario. To achieve the learning objectives, the simulated dysuria patient care scenario was conducted for 10 minutes. It was developed based on standard nursing procedures.

#### **B. Research Variables**

##### **a. Self-directed Learning**

The self-directed learning scale questionnaire was developed by<sup>18</sup> and translated by Jeong and Kim(1991)<sup>19</sup>. For the self-directed learning scale questionnaire, there were 58 items with a 5-point scale. The possible scores ranged from a maximum of 290points to a minimum of 58 points (higher scores indicated higher levels of self-directed learning). Cronbach's  $\alpha$  was .91 in the original scale and .92 in the present study.

##### **b. Problem-solving Competency**

The problem solving competency questionnaire was developed by the Korean Education Development Institute(2003).<sup>20</sup>for the problem solving competency questionnaire, there were 45 items with a 5-point scale. The possible scores ranged from a maximum of 225 points to a minimum of 45 points (higher scores indicated higher levels of problem solving competency). Cronbach's  $\alpha$  was .92 in the original scale and .92 in the present study.

##### **c. Data Collection and Analysis**

The data was collected according to the approved guidelines and screening procedures of "N" university located in Cheonan. Data were collected through a structured questionnaire to 42 nursing students who agree to participate in this study. The collected data was managed and analyzed using the Statistical Package for Social Sciences Software version 20.0. Descriptive statistics were calculated, including the frequency, mean, and standard deviation. Patterns in the differences among study participants were analyzed with paired t-tests.

### C. Results

#### a. General Characteristics

The participants of the study included 11 males (26.2%) and 31 females (73.8%). Thirty-two participants were over 21 years old (76.2%), and 10 participants were under 21 years old (23.8%). Thirty-two students answered that they were healthy, and 10 students answered that they possessed a moderate level of health. We asked the participants who influenced them the most when they chose their college major. Twenty-five students (59.5%) answered that they chose nursing themselves; 17 students (40.5%) answered that significant others influenced them. In terms of major satisfaction, the participants responded as follows: high, 21 students (50.0%); moderate, 18 students (42.9%); and low, 3 students (7.1%). Table 1

Table 1: General Characteristics of Subjects (N=42)

Characteristics		n (%)
Sex	Female	31 (73.8)
	Male	11 (26.2)
Age	≤21	32 (76.2)
	>21	10 (23.8)
Current Health condition	Healthy	32 (76.2)
	Neutral	10 (23.8)
Who has most influenced you? (when choosing your college major)	Self	25 (59.5)
	Significant others	17 (40.5)
Major satisfaction	High	21 (50.0)
	Moderate	18 (42.9)
	Low	3 (7.1)

#### b. The Effects of Simulation-based Learning on Self-directed Learning and Problem Solving Competency

The results showed that the average self-directed learning score was  $2.66 \pm 0.30$  points before the experiment and  $2.86 \pm 0.45$  points after the experiment. This was a statistically significant improvement ( $t=2.728$ ,  $p=.001$ ). On the other hand, simulation-based learning did not lead to a significant improvement in problem-solving competency. Therefore, the development of a program for self-directed learning is required to increase the effects of simulation-based learning. Table 2

Table 2: Difference between Pre-test and Post-test Self-directed Learning and Problem Solving Scores (N=42)

Variable		Mean±SD	t (p)
Self-directed learning	Pre	2.66±.30	2.728 (.009)
	Post	2.86±.45	
	Difference	.20±.47	
Problem-solving skills	Pre	3.17±.57	.690 (.494)
	Post	3.22±.51	
	Difference	.04±.43	

### D. Discussion

This study was conducted to identify the effects of simulation-based learning on self-directed learning and problem-solving competency among nursing students. Simulation-based learning led to a significant improvement in self-directed learning. This result is similar to Lee et al's study.<sup>21</sup> and self-directed CPR learning education.<sup>14</sup> The self-directed learning process provides students with the basic tools to be responsible for organizing and controlling their own learning. It is important that a student become aware of how he or she is learning. When students are given the opportunity to learn, they develop the ability to develop learning skills as they learn. Seale, J. K. reported the same result.<sup>22</sup>

Self-directed learning is the process of helping students to develop learning skills, meet learning objectives, and move toward targeted goals. Members of the organizing committee are very important because members of the organizing committee are united in all respects and take responsibility for their

leadership. In that sense, it is very similar to the process of simulation learning. In addition, simulation-based learning focuses on each member's responsibilities by assigning and resolving the clinical tasks of the students to the students themselves and solving them in the context of the situation.

This reason is why the current study suggests that significant changes in self-directed learning occur after simulation learning. Therefore, this study regards simulation-based learning as an effective learning method for improving self-directed learning attitudes among nursing students.

The current study also shows that simulation-based learning does not lead to a significant improvement in problem-solving competency. This result differs from the results of Lee et al.<sup>21</sup> These differences probably think the scenario would probably have different grades of the students which depends on whether a student is a senior or junior. In other words, it is thought that these differences arise from differences among school systems and the school year of the subjects.

The nursing process is a scientific process of collecting data, discovering problems in the data, and creating plans to troubleshoot problems which occur after a nursing diagnosis. Therefore, within that process, problem-solving is a very important part of the curriculum. These problem-solving skills are also important for improving the ability of nurses to work with other medical staff members and to perform clinical work within a healthcare organization. Thus, it is necessary to have a program to improve the problem-solving skills of nursing students in order to improve their ability to perform clinical trials.

In the current study, there was not a significant improvement in problem-solving competency, but the improvement in problem-solving skills which was shown in previous research indicates that further studies, examining the issue from various angles, are needed.<sup>23, 24</sup>

#### **IV. CONCLUSION**

This study was to examine the effects of simulation-based learning on self-directed learning and problem-solving competency among nursing students in Korea. After simulation-based learning, self-directed learning ability showed a significant improvement, but problem-solving skills did not. Follow-up studies, examining the issue from a variety of angles, must be undertaken to investigate the relationships among simulation-based learning, problem-solving competency, and clinical performance competency.

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## Correlation between AUDIT Scores, Aggression, and Depression of College Students in Korea

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### Abstract---

**Background/Objectives:** This study aims to examine the correlation among Alcohol Use Disorders Identification Test (AUDIT), aggression, and depression.

**Methods/Statistical analysis:** We collected data from university students in C province of Korea on 2015. They responded questionnaires of AUDIT scores, aggression, and depression. We analyzed 268 except for the incomplete twelve. We analyzed data through independent t-test, One-way ANOVA, and Pearson's correlation coefficients.

**Findings:** The level of aggression averaged 2.50 point and the depression averaged 2.40 point (both in 1-5 scale), and the AUDIT averaged 8.67 point (in 0-40 scale). 140 students (52.2%) was normal-drinking, 88 students (32.8%) was problem-drinking, 17 students (6.3%) was high level of alcohol problem, and 23 students (8.6%) was alcohol dependent. There was a significantly correlation between AUDIT and aggression ( $r=.26, p<.001$ ), and also positive correlation between aggression and depression. However, there wasn't a statistically significant correlation between AUDIT and depression.

**Improvements/Applications:** To alleviate the drinking problems of college students, nursing intervention is necessary. Also, the efforts should be made for early diagnosis of depression and negative emotions among college students, and the appropriate depression management programs should be promoted.

**Keywords---** Drinking Problem, Aggression, Anxious, Depression, College Students.

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## I. INTRODUCTION

According to 2013 National Health & Nutrition Survey in Korea, the drinking rate of adults was 77.0%. Those in their 20s, including college students, had the highest drinking rate of 88.0%<sup>1</sup>. The college students form their life-time drinking habits as the drinking had been prohibited before but now is optional<sup>2</sup>. Drinking problems of college students cause difficulties in school, loss of memory, unexpected casualties, acute or chronic diseases, spontaneous sexual contacts, sexual assault, and drunk driving. Such drinking problems can result in personal complications such as legal accusation, financial loss, or even physical disabilities, as well as undesired impacts on other people by financial damage, violence, sexual violence, and fights and disturbance<sup>3</sup>. While the drinking rate of male adults showed a minimal increase from 1998 (83.4%) to 2013 (85.9%), that of female adults notably increased from 59.3% to 68.7%, respectively; their problematic drinking rates (AUDIT 8 and above) increased from 3.1% to 11.7% and those with AUDIT 20 and above increased from 0.1% to 0.9% in respective years. In particular, the females in their 20s including college female students showed the problematic drinking rate of 30.5%, the highest compared to other ages<sup>1</sup>.

In South Korea, alcohol drinking with family, friends, and peer groups is part of the culture. It is traditional to consume alcohol in meals, family celebrations, and social events. In many countries, alcohol problem of college students is an important health-related. Heavy drinking leads to an increase of alcohol-related injuries<sup>4</sup> and can cause car accidents, aggression, poor academic achievement, and alcohol-induced disease<sup>5-8</sup>.

Alcohol is routinely cited as the most pervasively misused substance on university campuses<sup>9</sup>. The Danish students have shown that alcohol consumption is an integrated part of the student's life. In particular, during the first week of freshmen and throughout the first year, the students consumed alcohol frequently in a large amount<sup>10</sup>. The many studies on college students continue to document significant prevalence rates of alcohol consumption and misuse<sup>11</sup> and also, South Korea is no exception. There should be implemented nursing intervention toward reducing alcohol drinking.

Depression is one of the most common and important health problems<sup>12</sup>. About the third of college students (30.6%) are reported to have depression, which is much higher than the average of the adults (9.0%) in the United States<sup>13</sup>.

This study aims to measure the level of drinking problems and identify the correlation with aggression and depression of college students in South Korea.

## II. RESEARCH METHOD

### A. Research Design

This research is a descriptive correlation study designed to examine drinking problem, aggression, and depression of college students.

### B. Data Collection

The data was collected by a structural questionnaire completed by 268 students who agreed to participate in the study. We analyzed the data using SPSS ver. 18.0. Descriptive statistics for all study variables as well as the reliability assessment of the study instruments were computed.

### C. Measurements

#### **AUDIT Scores**

We used AUDIT (Alcohol Use Disorder Identification Test), translated by Kim, Oh, Park, Kim, and Oh<sup>14</sup>, which was developed by WHO (World Health Organization) to test the dependency on alcohol and problematic alcohol use of the subjects. WHO recommends to use AUDIT for identifying alcohol use disorder, and it has been used to assess alcohol dependency and problematic alcohol use in national health and nutrition survey in Korea since 2005.

AUDIT consists of 10 questions including the frequency and amount of drinking in the past year, alcohol dependency (uncontrolled drinking, impact on daily life, and drinking for hang over), and problems related to drinking (regret after drinking, blackout, drinking-related casualty, etc.). The eight questions (1 to 8<sup>th</sup>) are in 5-Likert scale (0 to 4) and the two remaining questions (9 to 10<sup>th</sup>) are in 3-Likert (0, 2, and 4), with the maximum score of 40. WHO suggests to consider scores below 8 as 'normal drinking', from 8 to 15 as 'problematic drinking', and from 16 to 19 as 'high-risk drinking, and 20 and above as 'likely to have alcohol dependency'. In this study the confidence level in Cronbach's  $\alpha$  was .86.

**Aggression**

We developed 9 questions for violence as their externalized behavioral problems, based on the Korean Youth Self-Report K-YSR translated from Achenbach<sup>15</sup>'s questionnaire by Oh, Lee, Hong, and Ha<sup>16</sup>, restructured by Ryu<sup>17</sup>. Each question asks about the student's behavioral problems for the last 6 months, answered in 5-point Likert scale, from 1 (Never) to 5 (Very much), with higher score indicating more behavioral problems in the corresponding area. In Hwang<sup>18</sup>'s study, the Cronbach's  $\alpha$  was .75 for violence, while this study had .77 for violence.

**Depression**

We developed 6 questions for depression as their internalized behavior problems, based on the Korean Youth Self-Report K-YSR translated from Achenbach<sup>15</sup>'s questionnaire by Oh, Lee, Hong, and Ha<sup>16</sup>, restructured by Ryu<sup>17</sup>. Each question asks about the student's behavioral problems for the last 6 months, answered in 5-point Likert scale, from 1 (Never) to 5 (Very much), with higher score indicating more behavioral problems in the corresponding area. In Hwang<sup>18</sup>'s study, the Cronbach's  $\alpha$  was .75 for depression, while this study had .81 for depression.

**D. Data Collection**

We collected data on October; 2015. The participants of this study were the university students in C Province of Korea. We collected 280 questionnaires. 12 questionnaires are insincere or missing answers. Finally, we analyzed 268 answers. It took 10 to 15 minutes to complete the survey questionnaire items, and after the questionnaire items were fulfilled, a predetermined gift was provided for participants.

**E. Data Analyses**

The collected data were analyzed by SPSS/WIN 20.0 statistical program. We calculated means and standard deviations by descriptive statistics. We computed differences of mean by t-tests and One-way ANOVA and correlations among variables by Pearson's correlation coefficient.

**F. Ethical Considerations**

We explained the research objectives, potential risks, benefits, and research procedures before starting the study to participants, survey data to be used only for the study purpose, anonymity and confidentiality of research participants, and a description of stopping during the creation of the questionnaire, and by receiving the consent from participants. They participated in the study with independent consent and signed a consent form.

**G. Limitations**

This study was constricted by convenience sampling, which limited generalization to a broad population.

**III. RESULTS**

**A. Participant Characteristics**

The baseline characteristics of the participants are shown in Table 1. The mean age of the participants was 20.62 years; 200 university students (74.6%) of them were female. Regarding religion, university students (81.0%) had their own sort of religion. In financial status, Sufficient 14 students (5.2%); average 212 (79.1%), insufficient 42 (15.7%). Extracurricular activity' yes, 81 (30.6%), no 186 (69.4%).

Table 1: General Characteristics (N=268)

Characteristics	Category	Mean±SD	n(%)
Age		20.62± 1.74	
Gender	Male		68(25.4)
	Female		200(74.6)
Religion	Yes		217(81.0)
	No		51 (19.0)
Financial status	Sufficient		14(5.2)
	Average		212(79.1)
	Insufficient		42(15.7)
Extracurricular activity	Yes		82(30.6)
	No		186(69.4)

### B. Descriptive Statistics for Variables

Descriptive statistics for aggression, depression, AUDIT are shown in Table 2. The level of aggression is 2.51 point (ranging 1-5) and the depression is 2.41 point (ranging 1-5). The level of AUDIT is 8.67 point (ranging 0-40). Regarding the numbers(%) of subscale of AUDIT, the numbers of normal drinking is 140 students (52.2%); problem drinking 88 students (32.8%); high level of alcohol problem 17 students (6.3%); alcohol dependence 23 students (8.6%).

Table 2: AUDIT, Aggression, and Depression of Subjects (N=268)

Variable	Category	Range of score	Mean±SD,	n(%)
Aggression		1~5	2.50±.57	
Depression		1~5	2.40±.65	
AUDIT score		0~40	8.67±7.08	
	Normal drinking	1~7		140(52.2)
	Problem drinking	8~15		88(32.8)
	High level of alcohol problem	6~19		17(6.3)
	Alcohol dependence	>20		23(8.6)

### C. AUDIT Scores, Aggression, and Depression according to Participant Characteristics

AUDIT scores, Aggression, and Depression showed no statistically significant differences by the general characteristics.

Table 3: AUDIT Score, Aggression, and Depression according to General Characteristics (N=268)

Characteristics Category	AUDIT scores		Depression		Aggression		
	Mean±SD	t/F (p)	Mean±SD	t/F (p)	Mean±SD	t/F (p)	
Gender	Male	8.23±5.84	-.577	2.40±.79	.038	2.43±.69	-1.097
	Female	8.81±7.46	(.564)	2.40±.60	(.969)	2.52±.53	(.273)
Religion	Yes	8.63±7.27	-.134	2.33±.64	-3.617	2.50±.59	-.148
	No	8.78±6.28	(.893)	2.69±.62	(<.001)	2.51±.49	(.883)
Financial status	Sufficient	11.50±7.56	1.296	2.36±.58	.267	2.58±.44	.197
	Average	8.41±6.81	(.275)	2.41±.65	(.766)	2.94±.58	(.822)
Extracurricular activity	Insufficient	8.91±8.17		2.34±.68		2.52±.55	
	Yes	8.12±7.66	-.831	2.35±.68	-.738	2.48±.58	-.336
	No	8.90±6.81	(.406)	2.42±.64	(.461)	2.51±.57	(.737)

### D. Correlation between AUDIT scores, Aggression, and Depression

Correlations are shown in Table 3. There was a significantly positive correlation between AUDIT and aggression ( $r=.26$ ,  $p<.001$ ), and also positive correlation between aggression and depression ( $r=.42$ ,  $p<.001$ ). However, there wasn't a statistically significant correlation between AUDIT and depression shown in Table 4.

Table 4: Correlation between AUDIT Score, Aggression, and Depression (N=268)

	AUDIT score	Aggression
	r(p)	r(p)
AUDIT score	1	
Aggression	.256 (<.001)	1
Depression	.046(.454)	.418(<.001)

## IV. DISCUSSION

In this study, the level of AUDIT was 8.67 point (ranging 0-40). Regarding the numbers (%) of subscale of AUDIT, the numbers of normal drinking was 140 students (52.2%); problem drinking 88 students (32.8%); high level of alcohol problem 17 students (6.3%); alcohol dependence 23 students (8.6%). This is higher than the results by Kim, JkKarl, Lee, and Park's study (8.29%) and the results by Lee and Kim's study (7.14% for female students).

In this study, AUDIT score showed no correlation with depression, but showed a positive correlation with aggression. Stress about future and career, no satisfaction in school, and separation from family causes the college students' depression<sup>20</sup>. College students are reported to experience difficulties in grades and

examinations, job search stress, soaring intuition and financial aids, and some students, and increasing number of students, even commit suicide due to the stress<sup>21,22</sup>.

Lee and Kim<sup>19</sup> reported that depression is closed related to drinking problems. Lee and Roh<sup>23</sup>'s study using AUDIT reported that the group of alcohol abuse and dependency had twice-higher risk of depression than normal drinking group, and the alcohol abuse and dependency group and problematic drinking group showed 1.5 to 2 times higher tendency to suicide than the normal group. Therefore, efforts should be made for early diagnosis of depression and negative emotions among college students, and the appropriate depression management programs should be promoted<sup>24,25</sup>.

This study showed that significantly positive correlation between AUDIT and aggression. Therefore, that is needed health promotion policy against alcohol use and aggression among college students. There is a necessity for better education about alcohol, general health in universities.

## V. CONCLUSION

The present study was designed to determine correlation between AUDIT and aggression, depression among college students to find out solutions that could improve the students' drinking problem.

In this study, the level of ADUIT was 8.67 point and the level of depression was 2.40 point; aggression was 2.50 point. Of the 268 subjects, 140 (52.2%) were normal drinking and 80 (30.7%) were problem drinking; 17 (6.3%) were high level of alcohol problem; 23 (8.6%) were alcohol dependence. AUDIT scores, Aggression, and Depression showed no statistically significant differences by the general characteristics. There was a significantly positive correlation between AUDIT and aggression, and also positive correlation between aggression and depression. However, there wasn't a statistically significant correlation between AUDIT and depression.

Therefore, the school and society need to build a system for early detection and management of the emotional problems of college students with various methods, and persistent efforts to balance the college students' physical health and mental health are called for.

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## The Effect of Job Stress on Musculoskeletal Symptoms in Physical Therapists

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### Abstract---

**Objectives:** This study is to identify how job stress affects musculoskeletal symptoms and what essential elements are required to improve psychological and physical working environment. Total 236 physical therapists were included in this study as subjects.

**Methods/Statistical analysis:** Research questionnaires were conducted amongst them. The questionnaires mainly consisted of a part of occupational stress and the other of subjective musculoskeletal symptoms. The subjective symptom areas differed depending on their work department (e.g., neurologic, musculoskeletal and pediatrics), and the most common symptom areas were their lumbar.

**Findings:** The factors that affected subjective lumbar musculoskeletal symptoms in the past 12 months were physical environmental factors and job instability among the sub-categories of job stress. Also, the factors that affected subjective lumbar musculoskeletal symptoms in the past 7 days were physical environment and organizational system.

**Improvements/Applications:** It was identified that physical therapists' emotional labor as well as physical environment, job instability and organizational system of sub-categories of job stress affected their subjective musculoskeletal symptoms.

**Keywords---** Emotional Labor, Job Stress, Musculoskeletal Symptom, Psychosocial Factor, Mental Health.

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## I. INTRODUCTION

It used to be generally believed that ergonomic factors were the primary ones of musculoskeletal diseases, but there have been numerous studies focusing on psychosocial factors as influence factors<sup>1</sup>. Lately, the concept of customer satisfaction oriented services is emphasized in many health care places in order to maximize their profitability<sup>2</sup>. Also, physical therapists, occupational therapists and nurses are likely to be more exposed to stress compared to other health care providers as they need to spend more time with patients and families<sup>2</sup>. To identify the social psychological factors that would cause musculoskeletal diseases of physical therapists, therefore, are also associated with prevention of such diseases, quality of life and quality of services to patients, and it would be very important to recognize how job stress affects subjective musculoskeletal symptoms<sup>3</sup>. Therefore, it can be said that physical therapists, occupational therapists, and nurse among hospital employees are exposed to job stress because they spend much time of facing patients or their guardians<sup>2</sup>. Stress is neurological, endocrine, immunological, physiological and psychological reaction in response to external stimulation and one of the risk factors that influence mental health<sup>4</sup>. Stress is a natural and inevitable phenomenon of human life and a certain amount of stress works as a dynamic force, necessary for our survival and well-being. On the contrary, when the intensity and frequency of stress exceed one's ability to cope with, maladjustment leads to various stress-related health problems<sup>5</sup>.

Stress intensity is gradually increasing due to heavy workload, role and interpersonal conflicts, lack of job autonomy, role ambiguity, inadequate compensation, irrational and authoritative organizational culture and others in the workplace<sup>6</sup>.

Physical therapists provide patients with treatment related to patients' physical activities, and their health status directly affects the quality of services related to treatment and rehabilitation for patients<sup>3</sup>. Therefore, to clearly understand psychosocial factors causing musculoskeletal disorders found in physical therapists primarily related to the quality of services for patients<sup>3</sup>. For instance, physical therapists' musculoskeletal symptom negatively affects their non-occupational life because health status is an important factor in the quality of life<sup>7</sup> and their perceptions of health as a large effect on the quality of life<sup>8</sup>. However, there is a lack of adequate understanding of the effects of job stress, and there is a demand for consensus also in mechanical research<sup>9,10,11,12</sup>. In particular, little research has been conducted on physical therapists in Korea.

Therefore, this study aims to examine the effects of occupational stress of physical therapist in Korea on subjective musculoskeletal symptoms and to investigate their current state.

## II. MATERIALS AND METHODS

### A. Sample and Data Analysis

To select research subjects for this study, I used a convenience sampling which is a type of non-probability sampling methods. All of the subjects of 236 physical therapists working in general hospitals, university hospitals, clinics and welfare centers were asked to complete questionnaires. SPSS program 18.0 was also used to analyze the data collected. Frequency analysis was used to find out the frequency and percentage of subjective musculoskeletal symptoms depending on working department, while logistic regression analysis was used to determine the effect of occupational stress on subjective musculoskeletal symptoms. The significance level was considered between  $p < .01$  and  $p < .05$ .

### B. Measures

#### *Job Stress*

Korean occupational stress scale was composed of 8 sub-categories (physical environment, job requirement, lack of job autonomy, Interpersonal conflict, job instability, organizational system, inappropriate compensation and culture of workplace) and total 43 questions.

#### *Nordic Style Questionnaire*

We used Nordic musculoskeletal questionnaire to compare total 9 areas of body (neck, shoulder, elbow, lumbar, hand/wrist, hip/thigh, knee and foot/ankle) and examine if there was any symptom related to musculoskeletal diseases<sup>13</sup>. We recorded all the details for 12 months and examined if any of the subjects had a symptom affecting their daily lives and if any new symptom was found in the past 7 days.

### III. RESULTS

#### A. Factors of Job Stress on Lumbar Musculoskeletal Symptom in the Past 12 Months

In order to investigate the effect of job stress on lumbar musculoskeletal subjective symptoms in the past 12 months, logistic regression analysis was conducted. As a result, physical environment( $p<.01$ ) and job instability( $p<.05$ ), which are sub-factors of job stress had a statistically significant effect on lumbar musculoskeletal symptom in table1.

Table 1: Factors of Job Stress on Lumbar Musculoskeletal Symptom in the Past 12 Months

Item	B	S. E	Wals	df	p
Physical environment	.038	.014	7.238	1	.007**
Job requirement	.026	.015	2.866	1	.090
Lack of job autonomy	.003	.017	.027	1	.870
Interpersonal conflict	.010	.015	.479	1	.489
Job instability	.043	.017	6.499	1	.011*
Organizational system	.014	.016	.783	1	.376
Inappropriate compensation	.017	.018	.891	1	.345
Culture of workplace	.005	.012	.142	1	.707
Constant term	3.052	2.074	2.164	1	.141

\* $p<.05$ , \*\* $p<.01$ ,  $r^2=.174$

#### B. Factors of Job Stress on Lumbar Musculoskeletal Symptom in the Past 7 Days

In order to investigate the effect of job stress on lumbar musculoskeletal subjective symptoms in the past 7 days, logistic regression analysis was conducted. As a result, physical environment( $p<.05$ ) and organizational system( $p<.05$ ) that are sub-factors of job stress had a statistically significant effect on lumbar musculoskeletal symptom in table2.

Table 2: Factors of Job Stress on Lumbar Musculoskeletal Symptom in the Past 7 Days

Item	B	S. E	Wals	df	p
Physical environment	.034	.012	8.236	1	.004*
Job requirement	.017	.013	1.712	1	.191
Lack of job autonomy	.002	.014	.014	1	.906
Interpersonal conflict	.010	.012	.612	1	.434
Job instability	.010	.013	.526	1	.468
Organizational system	.030	.013	4.979	1	.026*
Inappropriate compensation	.009	.015	.362	1	.547
Culture of workplace	.011	.011	.998	1	.318
Constant term	.020	1.696	.000	1	.990

\* $p<.05$ , \*\* $p<.01$ ,  $r^2=.106$

### IV. DISCUSSION

In this study, the classification of work areas of physical therapist is based on the research of Park<sup>14</sup> and National Rehabilitation center<sup>15</sup>. For effective analysis, the subdivided first questionnaire items of work areas were re-classified. Work areas were classified into four domains including neurologic(adult) physical therapy, musculoskeletal physical therapy, pediatric physical therapy, circulatory and respiratory systems, sports, thermoelectricity and hydrotherapy. Physical therapy areas with 30 samples or less excepting neurologic physical therapy, musculoskeletal physical therapy and pediatric physical therapy were excluded from analysis.

According to domestic and foreign preceding studies on musculoskeletal subjective symptoms, the biggest number of musculoskeletal subjective symptoms was found in the lumbar region<sup>16,17,18,19,20,21</sup>. In this study, the lumbar region occupied the highest proportion of musculoskeletal symptoms, but musculoskeletal symptoms varied depending on work areas.

In neurologic physical therapy, waist(76%) occupied the highest proportion of musculoskeletal subjective symptoms and it was followed by shoulder(67.5%), wrist/hand(66.6%) and neck(63.2%). In musculoskeletal physical therapy, neck(77.5%) and shoulder(77.5%) occupied the highest proportion of musculoskeletal

subjective symptoms and it was followed by waist(69.3%) and wrist/hand(62.3%). In pediatric physical therapy, wrist/hand(81.2%) occupied the highest proportion of musculoskeletal subjective symptoms and it was followed by waist(77%), shoulder(70.8%) and neck(66.6%).

However, it was hard to analyze the differences of musculoskeletal subjective symptoms only based on the frequency and proportion. For analyzing the differences of musculoskeletal subjective symptoms in 9 body regions depending on work domains, therefore, Chi-square test was carried out. As a result, each work domain displayed a statistically significant difference in hip/thigh( $p < .05$ ).

Job stress may be caused by job contents, role conflict, personal relationship at work, job instability and employment instability mainly. Job stress harms personal wellbeing by leading to psychological and physiological disorders and moreover causes economic losses due to an absence of productivity. Besides, it may negatively affect organizational goal orientation<sup>22,23</sup>.

It's been reported that doctors or nurses in medical practice are more stressed than other professions because of acquisition of new knowledge and skills, personal relationships with many different people and their professional position related to human life<sup>24</sup>. Physiotherapists were found to suffer less job stress than nurses. This is because physiotherapists in Korea are less responsible for decision making and patients and experience less mental conflicts on the job demand than nurses.

In this study, physical environment ( $p < .01$ ), job instability ( $p < .05$ ) and organizational system ( $p < .05$ ) were significant sub-factors of job stress physical therapists. For improving physical environments of the therapy room, it is thought that therapeutic equipment's and environments should be improved to reduce the traffic line in the therapy room and physical and mental burden of therapists.

Also, employment stability measures and wage increase are required to improve job instability and the vertical rank-oriented therapy room atmosphere needs to be changed. In addition, there is a need to develop a psychosocial therapy intervention politically.

## V. CONCLUSION

It was identified that physical therapists' emotional labor as well as physical environment, job instability and organizational system of sub-categories of job stress affected their subjective musculoskeletal symptoms. I suggest, therefore, further studies of plans for physical therapists' work environment improvement and prevention/ management programs to reduce their emotional labors and stress should be done.

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## A Study on Mobile Application Usage and Mobile Capability Divide by Age

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### Abstract---

**Objectives:** Investigation of mobile application usage characteristics by age through log data analysis to suggest policy implications to ensure enjoyment of benefits and reduction of information gap in older age groups.

**Method/Statistical analysis:** This study analyzed everyday mobile application log data of 2,280 nationwide Korean Android OS smartphone user panels throughout June 2015. Log data was collected by installing tracker applications that captured the applications in use. Number of users, usage duration and usage time were the primary statistics utilized. Log data was analyzed based on application types, recoded categories as well as specific applications, followed by comparison of outcomes across age groups.

**Findings:** Application usage duration turned out longest among teenagers and users in their 20s, while a gradual decreasing tendency was observed for users in their 30s or above. Younger age groups consisting of 10s-20s recorded longer usage for communication and networking/sharing applications, while older age groups spent relatively higher time using mobile commerce and online to offline (O2O) applications. More specifically, with respect to O2O, older age groups used e-wallet and membership more often, while younger age groups demonstrated heavier usage of delivery and transportation services. While usage durations for messenger and social network service applications were generally longer among younger age groups, users in their 50's recorded longer usage than those in their 40's when it came to messengers, hence revealing distinctive usage patterns between age groups. Despite noticeably low usage of mobile applications observed in older age groups, users were found to be experiencing various positive changes across many aspects in everyday life from smartphone usage. This demonstrates the importance of reducing mobile capability divide for older age groups.

**Improvements/Applications:** Mobile application is an important pillar of smart information. Policy measures focusing on educating and motivating older age groups to actively utilize mobile applications and enhance their capabilities are required.

**Keywords---** Mobile Application, Log Data, Mobile Capability Divide, Older Age Groups, Digital Media, Smart Information.

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## I. INTRODUCTION

The Smart Information Index, which focuses on the use of PCs and smart devices in the convergence of wired and wireless environments, found that the figure for those aged 50 or above was low at 56.3, assuming that the total for the population of Korea was 100<sup>1</sup>. Smart information index is constituted by a series of indices such as accessibility in terms of easiness of access to info-communicational devices such as computers or Internet, capability of handling info-communicational devices and its functions such as documentation and informational search, usage duration of info-communicational devices, along with the concept of utilization that demonstrates usage diversity.

The aspect that needs to be highlighted most in areas of smart divide occurrence is digital media literacy capability. Mobile plays a central role in informatization across all types of smart device usages. The ensuing information inequality in the mobile environment has resulted in the magnification of gap between age groups in terms of smartphone ownership, SNS usage, networking, community activities and online social participation as shown in Table 1<sup>2</sup>.

Table 1: Online Activities' Difference by Age Group

	20-30s	Above 60s
Smartphone ownership rate	98.9%	23.6%
SNS usage rate	86.4%	7.7%
Rate of creating network	85.8%	10.9%
Community activity rate	64.9%	5.3%
Participation rate on online community	56.8%	4.1%

Current figure corresponding to the average smartphone usage time -278.9 minutes (4 hours and 39 minutes) per day -recorded as of June 2015, explains for the steady increasing trend in usage time compared to 187.2 minutes in July 2013 and 268.4 minutes in January 2014<sup>3</sup>. Coupled with the increase in the number of smartphone owners and time spent on these devices, many resultant changes have occurred across various aspects of everyday life. Deeply ingrained in our everyday life, smartphones are no longer limited to serving purposes of communication, leisure, entertainment, and information, but are rather perceived as a medium that combines the whole of the existing media and diverse areas of daily life, and as an indispensable form of accompaniment to the human body. Regular Internet users select mobile as the primary device when they use services such as games, messenger, video calling, social networking and Internet surfing as shown in Table 2<sup>4</sup>.

Table 2: The Percentage those Who Selected Mobile as the Mainly Used Device in Each Activity

Casual game	79%
Instant messenger	75%
Video calling/calling	71%
Social networking	63%
Internet surfing	46%
Banking	44%
Searching product information	42%

Base: Those who connect internet once or more per week

Low figures documented for the older age group in the Smart Information Index signifies the possibility that users within this particular age group are excluded from the opportunity to live a high quality digital life and to participate in activities that create value in society, which can eventually incur further issues to do with sociocultural aspects. Growths recorded in mobile usage are driven largely by the development and use of mobile application. This study analyses log data based on mobile application usage to figure out the characteristics and difference in actual usage behaviors across age groups. The study also aims to suggest policy implications that can be used to leverage older age groups to actively utilize mobile applications and engage in practices for self-enhancement of application usage capabilities, thus to reduce the existing information gap.

Precedent studies regarding mobile applications have largely focused upon usage behavior and usability. Other studies have also investigated for factors affecting application usages, or relevance of application usage with socio demographic characteristics<sup>5, 6</sup>. In <sup>7</sup>studied application usability on smartphones and tablets, while<sup>8</sup>conducted case studies on application selection, installation and usage behaviors. Current studies feature topics to do with mobile commerce following increased interest for mobile commerce, through studies that aim to summarize properties of mobile commerce and identify success factors contributing to it, and through other studies that study features affecting preference on mobile shopping applications<sup>9, 10, 11</sup>.

Most commonly considered demographic factors when it comes to acceptance and usage of new technologies are age and generation gap. Previous studies have shown that smartphone usage is largely affected by socio-demographic factors such as age<sup>12</sup>. In<sup>13</sup> considered that regarding acceptance for communication technology, since younger generations are constantly exposed to diverse technologies since birth, technology plays a key role in their personal, social lives and even in their ways of thinking. Among socio-demographic characteristics, age and gender are indicated to have significant effects on application usage. Particularly among variables that predict usage rates of leisure, recreation and communication applications, age has been identified to function as the meaningful variable<sup>14</sup>.

In a comparative study of application usage by age groups, it has been figured that users above 50s show concentrated usage for certain particular applications, in higher degrees than users in their 10s-20s. Younger generations in their 10s-20s tended to reflect individual characteristics while also pursuing latest trends when it came to smartphone usage. However, users above 50s seem to place higher emphasis on homogeneity rather than on personal characteristics. While younger generations' smartphone usage patterns are centered on new service applications and on creating and sharing photos and videos, older generations above 50s still keep the same usage pattern that was observed prior to the appearance of smartphones. In fact, capability for media utilization that has been accumulated from the past, turned out to play the most important role in terms of smartphone acceptance and usage<sup>15</sup>. Among socio-demographic factors, effects of age and education levels remained significant and consistent.

Among studies related to digital divide, there has been increasing interest towards diminishing the digital gap on the basis of media literacy<sup>16</sup>. Socio-demographic factors such as generation that were identified to trigger information gap, were also found to be the primary causes behind media literacy gap. Internet usage capability displays an inverse relationship with age, and stark differences were observed between younger and older generations within the domain of content production and expression. Age factor turned out as the most crucial factor for explaining communication gap<sup>17</sup>. Gap by gender and age exist and constantly surface for each specific sub levels under capabilities of digital utilization, and among these, generational gap has been found to be particularly centered for those in their 50s-60s. It was identified that capabilities of information utilization and activities that involve social connections exert positive effects on acquiring informational support, and that these effects differ by ages<sup>18</sup>. By analyzing factors that constitute digital media literacy by age groups, older age groups showed the lowest evaluation in terms of self-expression efficacy and self-expression skills factor. Moreover, degrees of communication and sharing were also evaluated to be low, which highlight for the necessity for overall policy-wise guidance and support<sup>19</sup>.

## II. METHODS AND DATA SOURCE

Along with reference to other existing study analyses, this study included the analysis of quantitatively collected actual log data for application usages across large-scale panel of TNS Korea that own smartphones and use mobile applications. In<sup>20</sup> stated that everyday usage pattern and mobility, communication data cannot be analyzed in the absence of smartphones' logging capabilities and confirmed the strengths of log data in comparison to other research methodologies. Users' actual behavior data has been stated to be more competent and reliable tools for measuring actual usage volumes, rather than traditional quantitative surveys or self-ministered methods<sup>21</sup>.

Upon users' agreements, tracker applications were installed to collect data by capturing applications currently running or in use by users. Log data used for the analysis was a collection of everyday application usage from 2,280 Korean Android OS smartphone user panels, mainly during June 2015. Application usages were monitored throughout the day, from the moment of switch-on until the moment of switch-off of the smartphone. Most of the applications were utilized except for basic functions of the smartphone. Panelists providing application usage data were based nationwide, including areas such as Jeju Island and had age distributions between 15-59. As shown in Table 3<sup>22</sup>, sample quota was assigned proportionately, reflecting subscription by gender and age to network providers such as SKT, KT and LGU+.

Table 3: Sample Composition of Mobile Panel (unit: person)

Total	2,280	10s	207
Male	1,181	20s	479
Female	1,099	30s	540
		40s	559
		50s	495

Source: TNS Korea, Mobile log data of mobile panel, 2015.6

As for quality control, samples were considered to be valid and permitted for use in analysis only if a certain panel's log data was accumulated more than 10 days within a single month. Number of users(unique user) denotes the number of users utilizing a specific application during a specific duration, which was converted to units of percentage in relation to the total number of panel. Usage duration stands for the total period of time that a certain user spent on a particular application and was converted to units of minute for calculation. In the analysis, usage time was mainly used. Usage time can be defined by the outcome obtained by multiplying the unique user rate by usage duration. From results obtained, it was possible to calculate how much time the application is used for, based on the calculations.

Descriptive statistics suggest that as of June 2015, average daily smartphone use turned out to be 278.9 minutes while daily application use was 212.7 minutes. Teenagers and users in their 20s spent the longest hours on applications compared to any other age groups, with usage time showing gradual decrease upon reaching the age group of 30s. For example, daily application usage time of females in their 50s was found to be lowest, recording 151.9 minutes, which is just half the amount of time of female users in their 20s (285.3 minutes). Female group aged over 50 also used the least variety of applications. Thus we can safely assume that the number of applications used will be even lower among users in their 60s.

### III. RESULTS ANALYSIS

Besides usage time, different age groups also showed clear variations in the types of applications used as shown in Table 4<sup>22</sup>. Social media and media streaming application usage times were longer in users aged between 10s-20s, while usage times for mobile commerce and Online to Offline (O2O) applications were higher in those above 30s. Mobile Internet usage time was relatively higher for users between 20s-30s. Users in their 10s-20s use applications with higher focus on communication and status sharing, when users of older age groups tended to display tendencies of using applications for personal consumptions.

Table 4: Monthly Usage Time by Application Categories (unit: min)

	10s	20s	30s	40s	50s
Mobile internet	1382.2	1607.0	1518.3	1131.3	794.6
Social media	2605.7	2202.4	1209.0	808.4	840.2
Media streaming	840.8	537.5	383.8	236.7	208.4
Mobile commerce	67.2	148.6	294.8	247.5	131.7
Online to offline	13.1	60.4	113.4	151.2	120.2

Note: Reconstruction of raw mobile log data of TNS panel, 2015.6

Social media can be largely categorized into messenger and SNS/community. SNS/community application recorded longer usage duration in younger groups, while messenger was more heavily used by users in their 50's than those in their 40's. Table 5<sup>22</sup> demonstrates the ratio of usage duration by each application type in relation to total application usage duration by age. High contrasts in usage ratios were detected between different age groups, for instance, messenger, SNS/community and video streaming applications for users in their 10s, messenger and SNS/community for users in their 20s, mobile shopping for users in their 30s, mobile shopping and O2O for users in their 40s, and lastly O2O applications for users in their 50s.

Table 5: Usage Ratio of Main Application Categories by Age (unit: %)

	10s	20s	30s	40s	50s
Messenger	16.0	17.1	11.3	9.0	12.6
SNS/Community	15.6	9.8	6.8	5.5	6.1
Music streaming	1.7	0.7	0.3	0.3	0.4
Video streaming	8.5	5.9	5.4	4.0	4.2
Mobile shopping	0.8	1.8	4.3	4.3	2.8
Online to offline	0.2	0.7	1.7	2.7	2.7

Note: Ratio of use in relation to total usage time for a whole month

Among social media applications, Facebook, Twitter and Instagram were more heavily used by 10s-20s while Kakao story and Naver café recorded high usage time among users in their 30s. Naver band was relatively more used by 40s-50s, which altogether has implications for distinctive positioning of each application across different age groups.

Table 6<sup>22</sup> displays O2O application usage log data in detail. Usage time for transportation, delivery or real estate applications turned out to be higher in the 20s-30s group, while e-wallet or membership usage times

were relatively higher in the 40s group whose economic activity is generally wider and more varied in kind. These hint to distinctive usage trends established for different age groups, depending on each application's intrinsic properties and characteristics.

Table 6: Monthly Usage Time of O2O Application(unit: min)

	10s	20s	30s	40s	50s
Transportation/delivery/ real estate applications	4.5	12.4	11.9	5.7	2.9
E-wallet/membership applications	8.6	48.0	101.5	145.5	117.3

Note: Reconstruction of raw mobile log data of TNS panel, 2015.6

It could also be meaningful to categorize applications that mediate the sales of products or services as 'Sales mediation application', which include home shopping, open market, social commerce, application store, delivery and real estate applications to do with all temporary, short and long-term accommodation. The result is summarized in Table 7<sup>22</sup>. When compared by age groups, those in their 30s and 40s recorded the longest usage time, similarly with the case of mobile commerce.

Table 7: Monthly Usage Time of Sales Mediation Application(unit: min)

	10s	20s	30s	40s	50s
Sales mediation applications	147.4	176.6	290.7	219.5	142.5

Note: Reconstruction of raw mobile log data of TNS panel, 2015.6

Among overall application usage time, application usage ratio based on huge platforms such as Google, Naver, Kakao, Facebook, Twitter was identified. When actual log data was analyzed, as presented in Table 8<sup>22</sup>, usage dependency of users in their 10s was shown to be highest, while the ratio of use by those in their 40s-50s was relatively lower, implying different levels of usage dependency by age group. This conclusion originated from a somewhat shorter usage time in older age groups considering messenger and social content applications, relative to those of other age groups.

Table 8: Usage Time of 5 Major Platform Companies' Application(unit: min, %)

	10s	20s	30s	40s	50s
Google applications in total	1104.1	1154.2	972.0	641.5	528.8
Naver applications in total	1012.9	899.3	925.1	698.7	515.2
Kakao applications in total (game applications excluded)	1530.4	1628.5	998.3	731.7	728.9
Facebook applications in total	908.3	519.0	119.1	66.6	67.8
Twitter applications in total	131.8	36.9	9.3	11.2	8.0
Usage time of 5 major platform applications in total	4690.1	4241.9	3025.6	2150.5	1848.9
Share of 5 major platform applications in total	56.9	51.8	45.4	38.6	41.0

Note: 5 major platforms are Google, Naver, Kakao, Facebook and Twitter.

There have been significant changes on the overall landscape of digital media, while undergoing combinations with mobile platforms, channels and user data. New ways of communication is one of a number of important transformations made with the appearance of social media. Participative communication, which happens real-time, exerts strong impact on consumer attitudes that affect their actual networking, social activities and purchase behaviors<sup>23</sup>. Considering the degree of influence that real-time communication has, policy-wise support seems necessary for older age groups whose media utility is relatively lower, so that these users can easily utilize applications such as messengers, social network services or mobile commerce, and eventually receive the benefits given by entering into digital life.

#### IV. DISCUSSION

The level of satisfaction older age groups had towards life was observed to differ depending on the degree of mobile informatization. The ratio of responses labeled 'satisfied' turned out as 85.8% among smartphone owners, which was higher than non-owners(56.0%) by 29.8%. As shown in Table 9<sup>24</sup>, life satisfaction ratios of smartphone owners are generally higher compared to non-owners' even across each sub level category. Gaps between users and non-users further extended across other aspects, as users recorded higher levels of satisfaction than those of non-users for personal relations by 21.4%, for leisure and hobby activities by 33.6%, for physical and mental health by 35.5%, for social activities by 24.8%, and lastly for politics and government activities by 19.5%.

Table 9: Life Satisfaction by Smartphone Ownership

	Owner	Non-owner	Gap
Personal relations	83.4%	62.0%	21.4%
Leisure and hobby activities	79.0%	45.4%	33.6%
Physical and mental health	73.6%	38.1%	35.5%
Social activities	67.3%	42.5%	24.8%
Politics and government activities	46.8%	27.3%	19.5%

Moreover, analysis conducted on the degree of change following smartphone usage across older age groups revealed positive evaluations for all categories, as shown in Table <sup>24</sup>.

Table 10: Impact of Smartphone Usage

Impact of smartphone usage	Percentage of agreement
Accessed news and search information faster	77.4%
Acquired more information or knowledge	75.5%
Enjoyed more recreation time	73.5%
Communicated and shared their stories with friends more often	63.6%
Had more chances to network with other people	60.4%
Showed interest and participated in social issues	58.6%

This demonstrates the importance of bridging the mobile information gap for those who can potentially be left behind and marginalized. It was found that diverse life aspects of people in the older age groups can get affected and that these effects are not limited to their personal lives but may further influence community networking, social activities and participation.

In the same vein, mobile application, an important pillar of smart information, can be readily leveraged to serve a variety of useful purposes. One of the major factors that affect usage satisfaction, trust and loyalty for mobile applications is user interface quality <sup>25</sup>. Therefore, easy-to-use, convenient interface are required for users of older age groups. These users have relatively lower capability of self-expression or communication, which should be supported with training and education designed to aid these users to be able to express and share what they wish to communicate about. Enhancing utilization for mobile applications could lay a shortcut for that.

These findings call for policy measures that focus on providing information, educating and motivating those over 50s so that these prospective users can utilize mobile applications, digital information and enhance their capabilities. Since information gap or inequality can be accumulated and exacerbated during this process, implementations of appropriate policy measures are ever going to become more important. Once appropriate policies are put in place, those over their 50s or those who are marginalized from information will be able to enjoy communication, sharing of information via social media and networks. Furthermore, users will be led to enjoy convenient consumption methods and living patterns by making use of applications closely related to everyday life. These actions will ultimately contribute to the reduction of information inequality and inducement of participation from diverse groups when it comes to agenda setting or policy related decision making in the face of a social atmosphere involving continuous increase of rights for the general public to speak up, and softening of policy contents into everyday life-related issues through the effects of SNS and community applications.

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## What does Matter to Happiness?

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### Abstract---

**Objectives:** According to the Happiness-Income paradox by Easterlin<sup>1</sup>, cross-sectional data show that income growth is accompanied by increase in happiness whereas time-series data indicate that happiness somewhat decrease with or is not influenced by increased income. In reference to Easterlin paradox, this study aims to understand what influence the negative outcomes involved with increased income have on the relation between income and happiness.

**Methods/Statistical analysis:** In this study statistical analysis is conducted using the cross-sectional data (2011) of Income (Scale of Income) and Happiness of the United States from the WVS and time-series data (1972-2015) of Income (Real GDP per capita) and Happiness (by the GSS). In addition, hierarchical regression analysis is used to investigate what kind of influence Income inequality (Gini index based on household income) and Working hours (annual average per person), which have been drawn from previous studies, have on the relationship between income and happiness through mediating effect.

**Findings:** Replication study of the Easterlin paradox, which is divided into two tracks based the presence of Satiation point, the Happiness-Income paradox. Analysis of the cross-sectional data (2011) of Income (Scale of Income) and Happiness of the United States from the WVS indicated a positive (+) outcome [ $\beta = .062$ ,  $F = 82.406^{***}$ ,  $T = -9.078^{***}$ ] of happiness accompanying increased income whereas analysis of the time-series data (1972-2015) of Income (Real GDP per capita) and Happiness (by the GSS) showed a negative (-) outcomes [ $\beta = -3.468E-06$ ,  $F = 26.967^{***}$ ,  $T = -5.193^{***}$ ] of happiness irrelevant to increased income. In addition, according to the 3-step mediating effect test with hierarchical regression analysis, it was found that the effect of income on happiness is partially mediated by income inequality ( $B = -.483^{***}$ ) and working hours ( $B = .295^*$ ). In other words, negative outcomes such as income polarization and increased working hours involved with increased income rather reduce happiness, and hence are perceived as the paradox.

**Improvements/Applications:** While there are many existing studies which center on the determinants of income and happiness, the significance of this study can be found in its findings demonstrating that negative outcomes from increased income lead to the (happiness-income) paradox. It is suggested that future studies consider a wider variety of variables in investigating the relationship between income and happiness

**Keywords---** Easterlin Paradox, Happiness, Income, Gini Index, Workinghours, Inequality.

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## I. INTRODUCTION

According to previous researches, wealthy people are relatively happier than the poor. It has also been found that, on average, an individual's life in a wealthy country is happier than an individual's life in a poor country<sup>2,3,4,5</sup>.

However, Easterlin explained in his study, "Does Economic Growth Improve the Human Lot? Some Empirical Evidence," that while increased income has a positive (+) effect on happiness according to cross-sectional data analysis, time-series data analysis indicates that increased income has a negative (-) effect on happiness or shows no statistical significance to happiness, and thus, argued the presence of Income-Happiness Paradox<sup>6,7,8,9,10</sup>.

Further discussions about Easterlin Paradox are divided into two directions based on the presence of a satiation point. Scholars who stated that happiness is not always relative to income claimed that happiness is not always proportional to increased income because of the 'relativity of happiness' and adaptation to income and that a satiation point do exist.

On the other hand, scholars who argued that happiness is relative to income insisted that a satiation point does not exist because utility will increase, albeit marginal, with higher income according to "need theory" even for a person who already has high income.

Accordingly, following the theory suggested in the relative income hypothesis<sup>11</sup>, the concept of relative income gained attention with the assertion that an individual's 'aspiration' level called happiness has a relative property which is regulated in the relationship with others and is influenced by the income level of the group in which the person is involved.

However, while relative income is indeed an influencing variable of happiness, it failed to establish concrete implications as an analysis concept. This is because its directivity indicated a negative influence for the group which perceived an increase of relative income as comparative deprivation<sup>12,13</sup>, but a positive influence for the group which perceived relative increase of income as a change of income<sup>14,15</sup> and the definition of reference group was also unclear.

Then, a number of scholars including Wilkinson<sup>16,17</sup> asserted that economic growth does not determine happiness, health and quality of life whereas the level of income inequality (or income polarization) of a society might be a variable which explains happiness more accurately. A variety of discussions have developed centering on income inequality commonly measured by the Gini coefficient, but efforts for verifying its influence has been slow considering its importance.

Therefore, in order to understand the relationship between income and happiness which is repeatedly under debate, this study analyzes the presence of Income-Happiness Paradox through a replication study, and also examines how the Paradox is related to the variables which have been identified in previous studies as having direct/indirect influence on the relationship between income and happiness.

Advancing further from studies that mainly examined absolute income-happiness influence or relative income-happiness influence based on various reference groups, the present study aims to factor in both the absolute income and the Gini Index, a concept of relative income inequality, to examine their influence on happiness. In addition, by factoring in as a variable annual average working hours, which is closely related to wage that accounts for more than 80% of income, its influence in mediating between income and happiness will be verified.

## II. PROPOSED WORK

First, in order to verify the Income-Happiness Paradox once again, the relationship between income and happiness at a certain point of time is examined using Scale of Income and Happiness data of the United States, a cross-sectional data from the WVS. The replication study of the Paradox also uses Real GDP per capita and happiness data measured by the GSS (General Social Survey) from 1972 to 2015 for the time-series data (2002). The proposed Happiness-Income mediating effect model is shown in Figure 1. (Figure 1)



Figure 1: Research Model

When the Paradox is observed, the Gini index (based on household income), which is a measure of income inequality, and annual average of working hours per person are factored in as the negative variables involved with increased income so as to analyze their mediating effect between income and happiness. Definition and source of each variable are indicated in Table 1.

Table 1: Definitions and Sources of Variables

Real GDP per capita	Real GDP per capita(2015 dollar) Source : www.census.gov
GSS HAPPINESS	3=very happy, 2=pretty happy, 1=not too happy Source: www.gss.com
WVS HAPPINESS	1=very happy, 2=quite happy, 3=not very happy, 4=not at all happy Source: www.wvs.com
WVS INCOME	Scale of income 1=lower step, 11=highest step Source: www.wvs.com
Gini index	GINI index based on household income Source : www.OECD.org
Working hours	Annual average per person Source : www.OECD.org

### III. EMPIRICAL STUDY

#### A. Replication Study

##### Cross-sectional Data Analysis

Replication study analysis using the cross-sectional data indicated a positive (+) relation [ $\beta=-.062$ ,  $F=82.406^{***}$ ,  $T=-9.078^{***}$ ] between income and happiness at a given point of time in the United States as seen in Table 2.

Table 2: Replication study-Cross-sectional Data Analysis

	B	SE	$\beta$	F	R <sup>2</sup>	T
Scale of income	-.062	.007	-.190	82.406***	.036	-9.078***
1=very happy, 2=quite happy, 3=not very happy, 4=not at all happy Scale of income 1=lower step, 11=highest step * at the 0.10% level, ** at the 0.05% level, *** at the 0.01% level						

##### Time-series Data Analysis

As shown in Table 3, findings from time-series data analysis indicated a negative relation [ $\beta=-3.468E-06$ ,  $F=26.967^{***}$ ,  $T=-5.193^{***}$ ] between income and happiness.

Table 3: Replication Study-Time-series Data Analysis

	B	SE	$\beta$	F	R <sup>2</sup>	T
GDP percapita	3.468E-06	.000	-.625	26.967***	.391	-5.193***
3=very happy, 2=pretty happy, 1=not too happy Real GDP per capita(2015 dollar) * at the 0.10% level, ** at the 0.05% level, *** at the 0.01% level						

As shown in the Figure 2, happiness slightly decreased while income increased more than twice from \$ 25,079 in 1972 to \$ 51,385 in 2015.

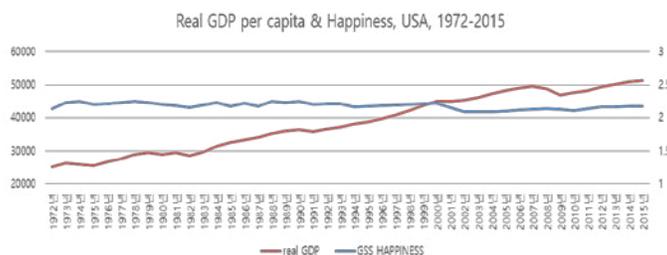


Figure 2: Replication Study-Time-series Data Analysis

In other words, it was found in the case of the United States that happiness varies with income growth at a point in time, but over the long-term it is not affected by income, thus demonstrating the Happiness-Income Paradox by Easterlin to be valid. Hence, income inequality and working hours were selected from previous

study as variables having negative influence on the relationship between income and happiness to verify their mediating effect.

**B. Mediating Effect Study**

Prior to verifying the mediating effect if income inequality and working hours, correlation analysis was conducted for all variables including income, happiness, inequality and annual average working hours to avoid multicollinearity problems and remove any output that with correlation coefficient value of 0.9 or above<sup>18</sup>.

Pearson correlation coefficient analysis results of all four variables were less than 0.8. Hence all four variables were considered in the regressions analysis. As shown in Table 4, analysis results indicated that income and income inequality have a negative effect on happiness, while working hours have a negative effect on income. The results may be attributed to the fact that the annual average working hours is somewhat declining in the United States. It is predicted that analysis results will be different for countries with high working hours

Table 4: Correlation Test Result

PERSON CORRELATION	Happiness	GDP per capita
GDP per capita	-.648**	
GINI INDEX	-.615**	.558**
WORKING HOURS	.598**	-.739**

\* at the 0.10% level, \*\* at the 0.05% level, \*\*\* at the 0.01% level

According to Baron&Kenny<sup>18</sup>, verification of mediating effect is as follows:

Direct effect refers to the influence the independent variable has on the dependent variable when the mediator variable is controlled<sup>19</sup>. Total effect refers to the sum of direct effect and indirect effect, with the former referring to the independent variable influencing the dependent variable directly and not by way of the mediator variable, and the later referring to the independent variable influencing the dependent via the mediator variable.

Hence, complete mediation occurs in a relationship in which the independent variable influences the dependent variable only through the mediator variable, that is, when the independent variable indirectly influences the dependent variable. Also, partial mediation occurs when the independent variable influences the dependent variable both directly and through the mediation variable.

Verification of mediating effect using a hierarchical regression analysis follows three steps. The first step involves confirming the influence of the independent variable on the mediator variable to be significant. The second step involves examining the relationship of the independent variable to the dependent variable. The third step involves verifying the mediating effect by confirming whether the influence of the mediator variable on the dependent variable is significant.

**Verification of Income-Income Inequality-Happiness Mediating Effect**

As shown in Table 5, test results of the mediating effect of income inequality in the relationship between income and happiness confirmed that income inequality has partial mediating effect, as the third step indicates that the negative effect of income on happiness is still significant (B=-.383\*\*\*) while the negative effect of income inequality on happiness is also significant (B=-.483\*\*\*)).

Table 5: Mediating Effect : Income-GINI-Happiness

	STEP 1		STEP 2		STEP 3	
	β	B	β	B	β	B
C	.350	.508***	2.238	-.628***	2.763	-.383***
GDP per capita	5.058E-07		-1.943E-06		-1.185E-06	
Gini Index					-1.500	-.483***
R <sup>2</sup>	.258		.394		.567	
Adj.R <sup>2</sup>	-		.136		.173	
F	18.571***		27.341***		26.894***	

\* at the 0.10% level, \*\* at the 0.05% level, \*\*\* at the 0.01% level

This means that even with increased income, the phenomenon of slight decrease in happiness will occur when income inequality increases along with income growth. Therefore, income growth alone cannot bring about increased happiness but must be accompanied by reducing the gap in income inequality.

**Verification of Income-Working Hours-Happiness Mediating Effect**

As shown in Table 6, test results of the mediating effect of working hours in the relationship between income and happiness confirmed that working hours has partial mediating effect, as the third step indicates that the effect of income on happiness is still significant (B=-.410\*\*) and the positive effect of annual average working hours to happiness is also significant (B=.295\*).

Table 6: Mediating Effect : Income-WH-Happiness

	STEP 1		STEP 2		STEP 3	
	β	B	β	B	β	B
C	1858.705	-.739***	2.238	-.628***	1.257	-.410**
GDP per capita	-.001		-1.943E-06		-1.269E-06	
Working Houers					.001	.295*
R2	.546		.394		.434	
ADJUSTED R2	-		.152		.040	
F	50.601***		27.341***		15.700***	

\* at the 0.10% level, \*\* at the 0.05% level, \*\*\* at the 0.01% level

As discussed earlier, it is hard to affirm that increase in working hours lead to happiness because the annual average working hours in the United States is on the decrease according to the time-series data. However, it is possible to expect that increased income from individual balanced working hours instead of the annual average working hours will lead to greater happiness.

**IV. CONCLUSION**

Discussions on whether increased income leads to greater happiness are expanding to include subjects about what variables other than income affect happiness or whether the relationship between income and happiness applies to other counties besides the United States.

In order to substantiate the Happiness-Income Paradox, a replication study was conducted using cross-sectional data and time-series data. Findings from the present study indicated that the Paradox holds true in the case of the US. However, the findings should not be read as grounds for stating that income is irrelevant to happiness or that happiness is not affected by income beyond a certain point.

The present study analyzed the mediating effect of two variables, income inequality and working hours, because it was presumed that the negative effects represented by deepened income inequality and high working hours accompanied by increased income could lead to a negative influence on the relationship between income and happiness. Results from the study demonstrated that these two variables partially mediate the relationship between income and happiness.

This study is significant in that it presents a new frame of analysis for the Happiness-Income Paradox itself moving away from the approach of existing studies that repeatedly focused on analyzing the influence of determinants of happiness.

In addition, this study recommends further research to analyze the relationship between income and happiness taking into account a wider variety socioenvironmental variables besides income inequality and working hours such as educational level, gender, and social support.

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## The Effects of Academy-Industry Collaboration On Culture Technology R&D Performance

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### Abstract--

**Objectives:** This research aimed at investigating the influence of academy-industry collaboration in cultural technology R&D output, also, suggesting collaboration type for effective output by investigating R&D output and providing an implication for strategy establishment.

**Methods/Statistical analysis:** This research comprehended R&D output of thesis Publications, patent, technical transfer, and sales, etc. targeting 201 CT R&D project that Korean government supported for 5 years between 2009 and 2014, and investigated academy-industry collaboration presence and the influence of collaboration type through the independent sample t-test analysis.

**Findings:** First, cultural technology R&D projects displayed higher output in thesis publication, patent, and sales except technical transfer, in case of academic-industrial collaboration.

Second, in case of academic-industrial collaboration, publication made by academic-industrial collaboration that was led by the university displayed higher output, and the academic-industrial collaboration lead by the corporation displayed higher output in sales.

**Improvements/Applications:** In respect of cultural R&D, it is necessary to actively suggest academic-industrial collaboration in policy. The existing common idea that activated exchange and collaboration between the subjects of each area of cultural technology area, as the convergent area, could create higher output was empirically proved in academic-industrial collaboration level.

**Keywords---** Culture Technology R&D, University-Industry Collaboration, R&D Performance, Culture Technology, Joint R&D.

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## I. INTRODUCTION

Technology competition becomes fierce among countries and convergence activity between different technologies is intensified according to the rapid development of technology. Culture Technology may be called a representative technology coming into existence according to convergence trends. As technologies such as hologram display and 3D film are merged with cultural contents, and new contents are created and converged service of various types is provided, Culture Technology developed into a new core growth engine of culture industry. Being aware of the importance of this Culture Technology, each country intensively supports R&D of technology relating to culture. In particular, Korea designates CT as one of 6Ts, promising technologies for the future together with IT, BT, ET, ST and NT, and classifies culture technology as one area of technologies for the first time in the world, and intensively supports R&D. As culture technology R&D projects have been carried out for 10 years from 2003 to 2014, 568 projects amount to a total of 260.67million dollars<sup>1</sup>.

In the light of characteristics of Culture Technology coming into existence through being merged with technology, it is possible to judge collaboration among various principal bodies and other areas in the planning and development of technology to be an essential approach to the creation of new technology and value. In particular, R&D activity to plan and create technology becomes more important as a means to ensure continuous competitiveness. And the importance of open innovation such as collaborative research with outside principal bodies is brought into relief. Nonetheless, studies on R&D performance through academy-industry collaboration have been incomplete. And the situation is that there is lack of profound studies on R&D performance focusing on culture technology in particular. Therefore, it is necessary to examine effectiveness such as whether collaborative research effectively works actually in culture technology R&D and whether to have a positive effect on performance.

This research aimed at investigating the influence of academy-industry collaboration in cultural technology R&D output, also, suggesting collaboration type for effective output by investigating R&D output and providing an implication for strategy establishment. For this, this research comprehended R&D output of Publications, patent, technical transfer, and sales, etc. targeting 201 CT R&D project that Korean government supported for 5 years between 2009 and 2014, and investigated academy-industry collaboration presence and the influence of collaboration type through the independent sample t-test analysis.

## II. LITERATURE REVIEW

### A. *Concept of Cultural Technology and Cultural Technology R&D*

The term Culture Technology(CT) is a new concept that appears through combination of culture and technology, accordingly, defined in various meanings. In a narrow meaning, it implies the technology utilized in value chain process as cultural contents planning, commercialization, media load, and delivery, etc. as the necessary factor to develop cultural industry. In a broad concept, it implies the concept that embraces overall complex technology including the knowledge and know-how of humanities, design, art field besides natural science study. In academy, it means the technology to improve quality of life that humankind manage and cultural art development, which can be comprehended as the technology to develop cultural art and an area of 'digital contents' that was adjunctly defined based on the concept of 'cultural industry'<sup>2</sup>. To view culture and technology as the separated viewpoint is an out-of-date concept. Technology and culture are not discriminable in respect of superiority, however they mutually have evolved by influencing each other.

Technical development and innovation have created a new culture, and culture again required an innovative technique by evolution, also, technology again has developed drawing an endless circular structure just as creating a new culture. Particularly, growth of cultural industry and development of technology have brought convergence of culture and technology, enabling cultural technology as the core technology of cultural industry.

In respect that CT does not merely indicate the technology itself but a technology targeting culture, it is a technology that can concretize human emotion and creativity based on creativity. That is, cultural technology provides a technology to realize liberal arts imagination based on "creation", the common feature of culture and technology, which implies a technique to perform a core role for technology to approach cultural consumer with human emotion. Such cultural technology takes a core role to enhance cultural industry value by being applied to the previous stage of value chain of contents industry. Particularly, cultural technology

indicates the cultural industry field that creates a new added value by adapting high technology to cultural industry based on high technology among cultural industry and culture. Such technical types where cultural technique is applied to culture are divided into 5 types, which are Creative Technology, Expressive Technology, Cultural Experience Technology, Cultural Management & Policy, and Cultural Socio-Humanities<sup>3</sup>. Awareness on the importance of cultural technology as the competitive factor of cultural industry became an opportunity to systematically promote CT R&D.

### **B. Research and Development Collaboration**

R&D collaboration is a special relation beyond a mere market deal contracted by the participant organizations for technical knowledge creation, acquisition, exchange, and utilization<sup>4</sup>. Such R&D collaboration has advantages such as enhancement of approach to major information of cooperative organization, utilization by combining with mutual complementary resources owned by the participants, and reinforcement of economic scale and temporal economic effect<sup>5</sup>. Also, various types can exist according to collaboration form, such as joint investment, joint research method, joint research and development agreement, technical exchange agreement, sub-contractor relationship and unilateral technical support, etc., also, can be divided into provider, competitor, customer, university, research institute, technical guidance, and educational training institute, etc. according to the target organizations<sup>6</sup>

The advanced researches related to cooperative research have provided valuable implications on the influence of various cooperative forms and types on corporate technical innovation output. There are lots of researches on output along with cooperation research between the industry and university in general research and development activity, and the motive-purpose of cooperation research. For example, there was a study about influence of private corporate R&D collaboration on labor productivity and marketing productivity targeting Dutch corporations between 1996 and 1998<sup>7</sup>. This research determined that point that the output differs according to the purpose of research and development cooperation and partner, concretely, research and development collaboration between university and competitors improves corporate growth, e.g. promotion of innovation and marketing, and R&D collaboration between customer company and university was determined to have an important role as a knowledge gate for a rapid innovation.

On the other hand, there was a study analyzed the corporation available for collaboration university and the industrial characteristic targeting Belgian manufacturing companies in 1993<sup>8</sup>. Through this, the researcher determined that the large companies are more inclined to cooperate with university, and cooperative research between corporation and university is performed when a company intends to get the know-how of university (implicit knowledge), and cooperative research between the industry and university is a part of various innovative activities that the corporate selects, such as internal R&D performance, public information securement, and R&D collaboration between the supplier and client company, etc., which is a complementary level of other innovative activities. Also, there was a study about the influence of collaboration with university on their output by targeting Brazilian corporation utilizing 2003 data.<sup>9</sup> This research determined a positive influence of collaboration between innovative corporation and university on productivity increase.

## **III. RESEARCH HYPOTHESIS AND RESEARCH MODEL**

Cooperative research, which is a research on the influence of collaboration among various agents on the output, has been variously conducted. Accordingly, recently cooperative research was defined in various terms as academic-industrial collaboration, technical collaboration, technical innovative network, etc. which have the same purpose to achieve collaboration with an active approach between the external subjects and create synergy. This research intended to define the research of performance by several subjects on creation of R&D output as scientific output, economic output, and social output, etc., as a collaborative research.

There was a research empirically analyzed the relation between R&D cooperative partner and innovation by utilizing structural equation model based on the research data targeting 137 Chinese small and medium-sized manufacturing companies<sup>10</sup>. As the result, an empirical conclusion was derived that small and medium-sized company can get a positive influence on their output as new product introduction and product innovation, etc. through R&D collaboration with governmental institute, research institute, and other institutes respectively. This research intended to analyze the influence of the availability of such cooperative research on output creation in cultural technology R&D.

Hypothesis 1. Cultural technology R&D would create higher output compared to single research progress, when in academic-industrial collaborative research.

Hypothesis 1-1. Cultural technology R&D would create more number of theses compared to the case of single research, when in academic-industrial collaborative research.

Hypothesis 1-2. Cultural technology R&D would create more patents compared to the case of single research, when in academic-industrial collaborative research.

Hypothesis 1-3. Cultural technology R&D would create more technical transfer compared to the case of single research, when in academic-industrial collaborative research.

Hypothesis 1-4. Cultural technology R&D would create more commercialized output compared to the case of single research, when in academic-industrial collaborative research.

Collaborative research form could be divided into competitor, provide, and client company or into enterprise scale, availability of domestic · overseas corporation, etc. Some research suggested 4 factors such as preliminary contact with the collaborative institute, competitive relation, strategical similarity, and corporate scale with the collaborative institute in respect of the characteristic of collaborative partner that has influence on the success of corporate unit research collaboration<sup>11</sup>. Also, in another research on the technical innovation output along with research collaboration in R&D project unit suggested the type of collaborative institute such as large company, university, etc., project scale, and number of collaborative institute, etc. as the success factor of collaborative research. This research displayed the significant influence only in the type of collaborative institute<sup>12</sup>. Besides the characteristic of collaborative organization, variables in collaborative contract, collaborative performing process, etc. were suggested as the factors that influence research collaboration. This research proceeded the analysis by concentrating on the academic-industrial collaboration performed with collaboration between the enterprise and the university, among the collaboration, aimed at comprehending the characteristic of each output along with collaborative type by dividing into the academic-industrial collaboration mainly with enterprise and that mainly with the university.

Hypothesis 2. Cultural technology R&D would display difference in output according to academic-industrial collaboration type (mainly by the enterprise vs university).

Hypothesis 2-1. Cultural technology R&D would display difference in the thesis publication output according to academic-industrial collaborative form (mainly by the enterprise vs mainly by the university).

Hypothesis 2-2. Cultural technology R&D would display difference in patent output according to academic-industrial collaborative form (mainly by the enterprise vs mainly by the university).

Hypothesis 2-3. Cultural technology R&D would display difference in technical transfer output according to academic-industrial collaborative type (mainly by the enterprise vs mainly by the university).

Hypothesis 2-4. Cultural technology R&D would display difference in commercialization output in academic collaborative form (mainly by the enterprise vs mainly by the university).

The research model is enumerated as follows as shown in Figure 1.

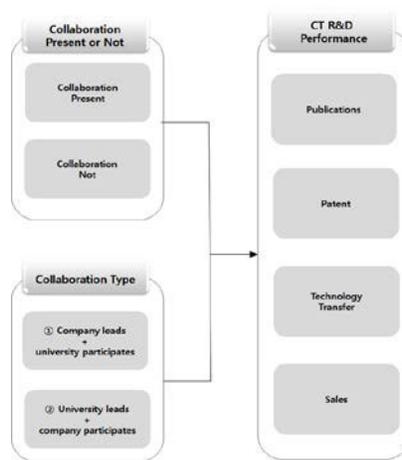


Figure 1: Framework of Analysis

## **IV. METHOD**

### **A. Materials**

This research utilized achievement evaluation material on 201 cultural technology R&D (business name : cultural technology research development business) performed with research development through the support of Korean government for 5 years until 2014.

Korean government conducts R&D support business, and annually lists up and manages the output thereof on the system in NTIS(National Science and Technology Information Service) system comprehensively. Therefore, this research secured reliability by utilizing data with public confidence and objectivity of NTIS data. Also, targeting the equal R&D performing subject, this research conducted output research by the same investigation table until 5 years during R&D performing period and R&D termination annually, which has the condition coinciding the panel data. Particularly, research and development investment occurs in a specific point of time, however the output has the characteristic to occur accumulatively in a regular time difference, accordingly, subordinate variable was measured by using accumulative total quantity of output in the period when the output occurs, excluding the data of 2015 and 2016 that could underestimate the output due to time difference.

Since this research aimed at investigating the effect of cultural technology on academic-industrial collaboration of cultural technology, accordingly the business that took the lead of the institute of the government institute or the government affiliates. Lastly, the data omitted with necessary items as collaborative form, leading institute, etc. were also excluded. Accordingly, final analysis target projects are 201 projects.

### **B. Research Variable and Analysis Method**

For the verification of hypothesis, this research divided availability of academic-industrial collaboration of each research and development business. This research indicated both cases as the industrial collaborative business when the supervising organization is a company while the participant organization is a school, and when the supervising organization is a school while the participant organization is a company, and divided into non-academic-industrial collaboration business when both supervising organization and participant organizations are companies or schools, and in case of a solo business.

Also, among the academic-industrial collaborative organization, in order to investigate the influence of output according to the type, this research divided into industrial organization centered academic-industrial collaboration (when the supervising organization is a company and the participant organization is a school or school and company) and school centered academic-industrial collaboration (supervising organization is a school and participant organization is a company, or a company or a company and a school).

The subordinate variables of this research were limited to some indicators, such as thesis publication, patent, and commercialization sales in case of the previous researches, however this research can be said to include the output indicator that can view the characteristic of major performing subjects of cultural technology research and development business, such as enterprises and universities, by including the whole cycle output on R&D logic model from technical transfer and commercialization. Therefore, subordinate variables were divided into the number of thesis publication, the number of patent, the number of technical transfer, and the number of commercialization.

This research set the output with thesis publication putting up in domestic and overseas regarding the thesis publication, total number of domestic and overseas registration and application case regarding patent, and output generation case regarding commercialization sales amount.

This research analyzed using SPSS 18.0 Version statistics program for Window after searching entry error, after encoding and coding of the collected data in NTIS. To investigate the influence of cultural technique R&D output along with availability of collaboration and type of collaboration.

## **V. RESULT**

### **A. Cultural Technology R&D Output according to the Presence of Academic-industrial Collaboration**

This research aimed at investigating the difference in cultural technology R&D according to the availability of academic-industrial collaboration. For this, this research conducted verification on average difference

between groups as shown in table 1.

Table 1: CT R&D Output According to the Presence of Academic-industrial Collaboration

R&D Performance	Academic-industrial research(n=77)		Non-academic-industrial collaboration research(n=124)		Average difference	t
	M	SD	M	SD		
Publications	13.792	24.785	5.539	14.976	8.253	2.872*
Patent	6.579	9.850	2.517	3.430	0.980	4.144***
Technology Transfer	0.56	1.803	0.408	0.825	0.152	0.798
Sales	4.8442	21.332	1.209	2.857	3.634	1.873**

Note: \*, \*\*, \*\*\* Show significance respectively in 10%, 5%, 1% level

Firstly, in case of thesis publication, the project made by academic-industrial collaboration displayed higher level of thesis publication output compared to the tasks not achieved by academic-industrial collaboration, and statistically, appeared significant in 10% level ( $P<.1$ ). Patent output also, higher level of patent output occurred in the projects made by academic-industrial collaboration, also, statistically significant result appeared ( $P<.01$ ). On the other hand, technical transfer made by academic-industrial collaboration project displayed somewhat higher output compared to those without academic-industrial collaboration, however statistically no significant difference appeared. Lastly, Sales displayed higher level of output in academic-industrial collaboration, which displayed statistically significant difference ( $p<.05$ ). That is, achievement in thesis publication, patent, commercialization output displayed difference according to whether of academic-industrial collaboration, particularly, the projects made by academic-industrial collaboration. This could be interpreted to generate higher thesis publication, patent, and commercialization output. Accordingly, Hypothesis 1-1, 1-2, 1-4 were supported, while 1-3 was rejected. This research aimed at investigating the difference in cultural technology R&D according to the availability of academic-industrial collaboration. For this, this research conducted verification on average difference between groups (table 1).

### B. Cultural Technology R&D Output According to Academic-industrial Collaboration Type

Along with whether of academic-industrial collaboration, this research investigated difference between the projects progressed mainly by the corporation and the projects progressed mainly by the school. The result is as follows as shown in table 2.

Table 2: CT R&D Output according to Academic-industrial Collaboration Type

R&D Performance	Company Leads(n=37)		University Leads (n=30)		Average difference	t
	M	SD	M	SD		
Publications	7.865	12.685	20.167	35.168	6.220	-1.978**
Patent	5.513	7.712	6.333	9.110	-0.820	-0.933
Technology Transfer	0.568	2.340	0.367	0.718	0.201	0.453
Sales	2.297	4.294	8.800	33.755	-6.503	-1.162

Note: \*, \*\*, \*\*\* are the significance respectively in 10%, 5%, 1% level

Firstly, in case of thesis publication output, the projects progressed by the school displayed much higher output compared to those progressed by the corporation, also, statistically significant result appeared ( $P<.05$ ). On the other hand, in case of patent, the projects lead by the school displayed higher average value, while the projects lead by the corporation displayed higher average value in case of technical transfer respectively, however both cases did not display statistically significant difference ( $P>.01$ ). Lastly, in respect of commercialization, the projects lead by the corporation displayed higher level of output than those by the school, which result was analyzed statistically significant ( $P<.05$ ).

In conclusion, among the projects made by academic-industrial collaboration, R&D projects lead by the school displayed higher thesis publication output displayed higher thesis publication output compared to those by the corporation, and in case of commercialization, the projects lead by the corporation recorded higher output compared to those projects lead by the school (hypothesis 2-1, hypothesis 2-4 were supported). On the contrary, in case of patent and technical transfer output, no difference appeared between academic-industrial collaboration lead by the corporation and that was led by the school.

## VI. CONCLUSION

As the result of the empirical analysis result, major content can be summarized as follows. First, cultural technology R&D projects displayed higher output in thesis publication, patent, and sales except technical transfer, in case of academic-industrial collaboration.

Second, in case of academic-industrial collaboration, publication made by academic-industrial collaboration that was led by the university displayed higher output, and the academic-industrial collaboration lead by the corporation displayed higher output in sales. This can be interpreted that the academy oriented characteristics of school and the profit oriented characteristics of corporation were reflected. On the contrary, in respect of patent and technical transfer, influence on the output according to academic-industrial type displayed no significant difference, accordingly, output of cultural technology R&D along with academic-industrial collaboration type partly displayed the correlation.

This research conducted an empirical analysis of the effectiveness of academic-industrial policy of the government based on the concrete data targeting cultural technology research and development business. The result of investigating the difference compared to the advanced researches of the point of new contribution to policy establishment or academic level is as follows. First, in the situation when the research on cultural technology R&D output is insufficient, this research conducted a concrete analysis only on the specialized area in cultural technology. Since this research performed an empirical analysis on the 5 years' output mainly with the cultural technology research and development business, which is research and development support business specialized in cultural technology, conducted by Korean government, accordingly, this research can be the initial research on cultural technology R&D output. Also, this research statistically proved the necessity of collaboration in cultural technology by statistically comprehended the influence of each output in cultural technology R&D along with academic-industrial collaboration and academic-collaboration type.

Based on the above, the policy implication of this research is as follows. In respect of cultural R&D, it is necessary to actively suggest academic-industrial collaboration in policy. The existing common idea that activated exchange and collaboration between the subjects of each area of cultural technology area, as the convergent area, could be created higher output was empirically proved in academic-industrial collaboration level. Therefore, it is necessary to prepare various institutional devices to promote academic-industrial collaboration, such as presentation of advantage, etc. in case of academic-industrial collaboration when selecting national research and development support business of cultural technology. Next, in respect of the influence on cultural technology R&D output along with academic-industrial collaboration type, in the result where academic output as thesis publication appeared high in management of school while economic output as commercialization appeared high in management of corporation, it is determined to be necessary to plan the type of project. For example, in case of the R&D project in cultural technology area that could create economic value when the basic research was performed to a certain degree, academic-industrial collaboration should be planned, while it is in a basic research stage or the project in a new technical area, more effective output could be created by inducing a structural collaboration that can lead the project mainly by the university.

However, due to limitation of data collection, this research has a limitation that it was researched mainly based on the number of research and development output. In case of commercialization, more concrete output comparison could be possible when investigating the variable of commercialization than the number of commercialization. Also, as this research focused on academic-industrial collaboration, this research excluded the cases of national institute as the institute that lead the research, henceforth, it is necessary to include R&D output of national institute, technical spread, in future research. Also, a follow-up research on the influence of the variables such as research expense, number of researcher, research field, number of employee, sales amount, and research and development investment amount, etc. on cultural technology R&D output.

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# A Comparison of First-year and Senior Health-related University Students' Biomedical Ethics Awareness

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## Abstract---

**Objectives:** The purposes were, first, to identify whether the clinical experience of health-related university students influences their ethical values and, secondly, to determine what factors influence the understanding of biomedical ethics.

**Methods/Statistical analysis:** A total of 811 health-related university students (355 students with clinical practical experience [CPE]; 476 students with no clinical practice [NCP]) were recruited from six different BSN programs in one city in South Korea. Data were analyzed using descriptive statistics, a  $\chi^2$ -test, a t-test, a one-way ANOVA, and a Scheffe test using the SPSS/WIN 17.0 program.

**Findings:** Comparing the differences in the values or ethical attitudes of the two groups, NCP students were found to have a more deontological orientation (2.76 for CPE students; 2.81 for NCP students). There were statistically significant differences between the responses of the two groups in the following areas: the right to life of a fetus, the right to life of newborns, artificial abortion, and brain death. For the NCP students, the predicting variables were the following: ethical values, club participation, and source for information or knowledge of biomedical ethics.

**Improvements/Applications:** It is argued that the clinical experience of health-related university students should be regarded as an important factor in the development of educational programs in biomedical ethics for health-related university students.

**Keywords---** Health-related University Students, Ethical Values, Ethical Attitudes, Biomedical Ethics, Clinical Experience, Educational Programs.

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## **I. INTRODUCTION**

### **A. Necessity of the Study**

With the rapid advance in bioengineering and biomedical studies in recent years, humanity came to have the ability to artificially prolong life span and control birth of life.<sup>1</sup> Related ethical issues are different in essential nature and scope from those of the past, which caused confusion in which existing ethical standards and judgments cannot be applied<sup>2</sup> and extreme individualistic tendency of thoughts which development of commercialism has brought further facilitate moral crisis.<sup>3</sup>

As these phenomena have not been exception in medical fields as well, medical technicians came to have more opportunities to participate in important decision-making related to human life and rights in which they experience various inner ethical conflicts. Difficulty in judgment when facing ethical situations works as stumbling block for medical technicians, which in turn lead them to feel helplessness easily and take defensive behaviors, which results in experience of serious psychological, mental and social problems.

This also applies to the health-related university students who will become the future medical technicians. That is, ethical education taught in universities and colleges is too deficient to enable students to understand complex ethical problems experienced during clinical practices,<sup>4</sup> which causes a lot of stress and psychological conflicts.

These ethical conflicts not only work as a serious impediment to the development of professional medical technic by causing negative reverberations on quality improvement of, and job satisfaction with, medical technic practice but also require clear judgment on the behaviors to be performed by medical technicians as many ethical questions faced in the field of medical technic have to do with the nature of medical technic.

Thus, if health-related university students can establish desirable and solid ethical values before becoming medical technicians, they will have better ability to respond to various medical and ethical problems they will face and enhance their competencies as medical professionals. In addition, as they can have better ability to make rational judgments and right decisions for various ethical dilemmas which they will confront in the future as medical technicians, they can provide quality medical technic and enjoy enhanced job satisfaction.<sup>5</sup>

In order for health-related university students to be equipped with desirable ethical decision-making capability, it is necessary to establish systematic medical technic education courses which can cultivate solid ethical values and moral problem-solving abilities. However, although ethical education in Korea has rapidly increased in quantity, there is still lack of qualitative growth due to deficient time assigned for education, ethics education by rote and unrealistic curriculums, which raises necessity to develop education that can complements these deficiencies.

Therefore, in order to promote qualitative growth of medical technic ethics for health-related university students, this study aims to investigate ethical tendencies of freshmen without clinical practical experience and seniors who have directly and indirectly experienced exposure to ethical problems through decision-making on ethical conflicts and to suggest directions for ethical medical technic education and provide basic materials for the development of proper educational programs.

### **B. Purpose of the Study**

The purpose of this study is to compare the characteristics and tendencies of biomedical ethics of health-related university freshmen and seniors and, based the results, to provide basic materials to establish system and suggest educational directions for health-related ethics education. Detailed purposes are as follows;

- Investigate the subjects' general characteristics and characteristics related to biomedical ethics
- Compare subjects' values of biomedical ethics
- Compare subjects' values of biomedical ethics based on the subjects' general characteristics and characteristics related to biomedical ethics

### **C. Terminology**

#### **Biomedical Ethics**

Biomedical ethics is the term created to solve moral and ethical problems arising out of radical development of biomedical and medical technologies. In this study, it refers to the scores measured with questionnaires based on GyuSook Lee's<sup>6</sup> 29 questions and Chang Sup Choi's<sup>7</sup> 25 questions corrected and

modified by SeonJoo Kwon<sup>8</sup>, which is composed of 9 sub-domains of fetus' right to life, artificial abortion, artificial insemination, diagnosis on fetus, premature baby's right to life, euthanasia, organ transplant, brain death and bioengineering. The higher the measured score, the more deontological ethical tendency while the lower the measured score, the more utilitarian ethical tendency. Detailed meanings are as follows;

#### Deontology

Deontology is an ethical theory which emphasizes absolute moral codes that should be observed under any circumstances, which are the ultimate standards in the judgment of right or wrong and goodness or viciousness and are the laws of practical reason to be absolutely observed.

#### Utilitarianism

Utilitarianism is an ethical theory which has the principle of usefulness as moral standard for goodness of behaviors and aims at 'The greatest happiness of the greatest number.' That is, it considers the principle of the greatest happiness as the foundation of morals and thus, behaviors promoting the happiness are good while adverse cases are vile.<sup>9</sup>

## II. STUDY METHODS

### A. Design of the Study

This study is a descriptive survey research conducted to compare characteristics and tendencies of freshmen with those of seniors of health-related universities and located in G-province.

### B. Subjects of Study and Collection of Data

The subjects of this study were freshmen without any clinical experiences and seniors who completed major courses and had longest clinical practices of 6 health-related departments of universities in Gyeongbuk regions who were selected by the method of convenience sampling among those who understood the purpose of this study and expressed intention to voluntarily participate in this study.

For the collection of data required for this study, a questionnaire survey was conducted after explaining the purpose, method of data collection and procedure to professors in charge in each university and earning their approval. After questionnaires were distributed to all the students, the purpose of this study was explained and the students who want to participate in this study were asked to sign on the intention to participate and were asked to fill out structured questionnaire while those who don't want to participate were asked to submit the questionnaire as they receive them, making it unclear who agreed to participate and who did not. Time required for questionnaire was 10 to 15 minutes.

Participants of this study were 487 freshmen and 341 seniors and, among these students, a total of 811 questionnaires were collected for final analysis except for 11 questionnaires from freshmen and 6 ones (17 in total) from seniors with incomplete responses.

### C. Subjects of Study and Collection of Data

Structured questionnaire used in this study was composed of 11 questions on general characteristics and 7 questions related to biomedical ethics and in order to measure values on biomedical ethics, this study used Sun JooKwon's reconstruction (2003) of Gyu Sook Lee's 29 questions (2002) and Jang Sup Choi's 25 questions (2002) into 49 questions in 9 domains except for 1 question on artificial abortion which does not fit the purpose of this study.

A total of 48 questions were finally used on biomedical ethics in this study (5 questions on fetus' right to life, 5 on artificial abortion, 7 on artificial insemination, 5 on diagnosis on fetus, 5 on premature baby's right to life, 5 on euthanasia, 4 on organ transplant, 5 on brain death and 7 on bioengineering).

Each question was constructed in Likert-style 4-point scale; 'agreed' was 4 points, 'generally agreed' 3 points, 'generally objected' 2 points and 'objected' 1 point. Questions in utilitarian position were inversely calculated with higher points meaning deontological tendency while low points meaning utilitarian tendency. In Sun JooKwon's study, reliability was Cronbach's  $\alpha$  of 0.76 while, in this study, Cronbach's  $\alpha$  of 0.81.

### D. Methods of Data Analysis

Collected data was analyzed by statistical program SPSS window version 17.0 (SPSS Inc., Chicago, IL, USA) and methods of statistical analysis are as follows:

- Subjects' general characteristics and characteristics regarding biomedical ethics were analyzed with frequency, percentage and  $\chi^2$ -test
- Comparison on values of biomedical ethics by subjects was analyzed with mean, standard deviation and t-test
- Difference in values of biomedical ethics based on general characteristics and characteristics related to biomedical ethics was analyzed with t-test and ANOVA and Scheffe's test was used for post test

### III. STUDY RESULTS

#### A. General Characteristics of Study Subjects

General characteristics of the subjects are presented in Table 1. Gender-wise, 88.9% were female students and 52.3% of the subjects were religious, among whom 23.9% were Christians followed by 17.5% Buddhists and 10.0% Catholics. As for participation in religious activities, 18.7% responded that they are 'engaged in religious activities in the minimum level' followed by 18.5% who are 'active' and 11.1% who are 'engaged in activities from time to time.'

To the question if the subjects have family members who are engaged in medical profession, 12.5% of the subjects responded with positive answer. 62.6% of the subjects were involved in club activities and 33.2% responded that they are 'active' followed by 13.9% who replied they 'participate sometimes', 8.1% who said 'very active' and 7.6% who 'participate minimally.' As for the purpose of participating in the clubs, 22.9% were for volunteering services followed by other reasons with 16.6%, hobbies with 12.0%, education and research with 8.9% and meeting with alumni with 2.6%. As for current place of residence, 54.6% lived in metropolitan cities followed by those who lived in small and medium cities with 31.3% and those in agricultural and fishing areas with 14.1%.

Table 1: The General Characteristics of the Subjects (n=811)

Variables	Classification	Total (n=811)	Freshman (n=476)	Senior (n=335)
		n (%)	n (%)	n (%)
Gender	Male	90(11.1)	63(13.2)	27(8.1)
	Female	171(88.9)	413(86.8)	308(91.9)
Religion	Protestant	194(23.9)	108(22.7)	86(25.7)
	Catholic	81(10.0)	45(9.5)	36(10.7)
	Buddhist	142(17.5)	89(18.7)	53(15.8)
	None	387(47.7)	230(48.3)	157(46.9)
	Others	7(0.9)	4(0.8)	3(0.9)
Level of participation in religious activity	Most active	31(3.8)	16(6.5)	15(8.4)
	Active	15(18.5)	91(37.1)	59(33.1)
	Somewhat active	90(11.1)	58(23.7)	32(18.0)
	Least active	152(18.7)	80(32.7)	72(40.4)
Family members' involvement in medical related areas	Yes	101(12.5)	59(12.4)	42(12.5)
	No	710(87.5)	417(87.6)	293(87.5)
Bioethic related club activity	Yes	508(62.6)	325(68.3)	183(54.6)
	No	303(37.4)	151(31.7)	152(45.4)
Level of participation in campus group activity	Most active	66(8.1)	44(13.5)	22(12.0)
	Active	269(33.2)	185(56.7)	84(45.7)
	Somewhat active	113(13.9)	75(23.0)	38(20.7)
	Least active	62(7.6)	22(6.7)	40(21.7)
Types of club activities	Volunteering activity	186(22.9)	124(37.9)	62(33.7)
	Hobby	97(12.0)	60(12.6)	37(20.1)
	Education & reserch	72(8.9)	43(13.1)	29(15.8)
	Alumni meeting	21(2.6)	14(4.3)	7(3.8)
	Others	135(16.6)	86(26.3)	49(26.6)
Areas of living	Megalopolis	443(54.6)	261(54.8)	182(54.3)
	Small town	254(31.3)	147(30.9)	107(31.9)
	Rural	114(14.1)	68(14.3)	

#### B. Characteristics and Comparison of Differences related to Biomedical Ethics of Freshmen and Senior Health-related University Students

Characteristics and comparison of differences related to the subjects' biomedical ethics of are presented as Table 2. To the question "Do you know about biomedical ethics?", 92.0% of freshmen said 'yes' and 98.2%

of seniors said so while 2.3% said they are not interested, showing that there are statistically significant difference between the two groups ( $p < 0.001$ ). As for the method to acquire knowledge or information about biomedical ethics, in freshmen, TV was 38.2% followed by school courses (24.6%), internet (14.9%) and various books (10.3%) whereas in seniors, school courses were 55.8% followed by TV(23.0%), various books (11.2%) and internet (8.2%), demonstrating that there is statistically significant difference between the two groups ( $p < 0.001$ ).

To the question regarding the degree of establishment of subjects' ethical values, in freshmen, the answer "it depends on the situations" was 52.1% followed by "sometimes confused" with 25.6%, "firm" with 19.5% and "not so firm" with 2.5% while, in seniors, the answer "it depends on the situations" was 48.2% followed by "sometimes confused" with 35.2%, "firm" with 16.2% and "not so firm" with 0.3 %, displaying statistically significant difference between the two groups ( $p < 0.003$ ).

To the question regarding the appropriateness of the quantity and quality of current biomedical ethics education, 82.5% of freshmen responded 'inappropriate' while 65.4% of seniors did, showing statistically significant difference between the two groups ( $p < 0.001$ ). To the question if the subjects have experienced conflict from biomedical ethical problems, the greatest percentage 48.3% of freshmen responded 'no' while the greatest percentage 49.9% of seniors did. 13.0% of freshmen said "not interested" while 9.3% of seniors came up with the same answer, showing statistically significant difference between the two groups ( $p < 0.005$ ). To the question if the subjects are willing to participate in classes on biomedical ethics in the future, 64.2 responded 'yes' while 21.1% said 'not interested' and to the question if biomedical ethical problems will gradually increase with the development of bioengineering, 91.0% of total subject replied 'yes.'

Table 2: Comparison of Biomedical Ethics Related Characteristics between First Year and Senior Health-related Students (n=811)

Variables	Classification	Total(n=811)	Freshman(n=476)	Senior(n=335)	$\chi^2$ (p)
		n (%)	n (%)	n (%)	
The experience of hearing for biomedical ethics	Yes	767(94.6)	438(92.0)	329(98.2)	15.45 (<0.001)
	No	25(3.1)	23(4.8)	2(0.6)	
	Not interested	19(2.3)	15(3.2)	4(1.2)	
Source for information or knowledge of biomedical ethics	TV	258(31.8)	182(38.2)	76(23.0)	75.54 (<0.001)
	Book, newspaper, magazine	86(10.6)	49(10.3)	37(11.2)	
	School class	301(37.1)	117(24.6)	184(55.8)	
	Internet	98(12.1)	71(14.9)	27(8.2)	
	Training, lecture	11(1.4)	7(1.5)	4(1.2)	
	Others	16(2.0)	14(2.9)	2(0.6)	
Ethical attitude	Very firms	147(18.1)	93(19.5)	54(16.2)	14.08 (0.003)
	Sometimes confused	240(29.6)	122(25.6)	118(35.2)	

### C. Comparison of Differences in Values of Biomedical Ethics between Freshmen and Senior Health-related University Students

Comparison of differences in values of biomedical ethics between the two groups is presented in Table 3. First, as for total mean score for biomedical ethical consciousness, freshmen recorded 2.81 while seniors marked 2.76, illustrating that freshmen had statistically stronger deontological tendency than seniors ( $p = 0.011$ ). To list sub-domains in the order of stranger deontological tendency for the two groups, premature baby's right to life came first followed by fetus' right to life, diagnosis before birth, organ transplant, artificial insemination and bioengineering while, in the order of stronger utilitarian tendency, artificial abortion took the first place followed by brain death and euthanasia.

There were statistical differences in ethical tendency between the two groups in fetus' right to life (3.33 points for freshmen, 3.13 points for seniors) ( $p = 0.008$ ) and premature baby's right to life (3.28 points for freshmen, 3.19 points for seniors) ( $p = 0.007$ ), exhibiting stronger deontological tendency for freshmen than seniors, while artificial abortion (2.44 points for freshmen, 2.34 points for seniors) ( $p < 0.001$ ) and brain death (2.09 points for freshmen, 2.02 points for seniors) ( $p = 0.005$ ) displayed stronger utilitarian tendency for seniors than freshmen.

Table 3: Comparison of Biomedical Ethical Values between First Year and Senior Health-related Students(n=811)

Variables	Total (n=811)		Freshman (n=476)		Senior (n=335)		t	p
	M±SD	Rank	M±SD	Rank	M±SD	Rank		
Right to life of fetus	3.19±0.53	2	3.33±0.54	1	3.13±0.52	2	2.64	0.008
Artificial abortion	2.40±0.42	8	2.44±0.45	8	2.34±0.38	8	3.53	<0.001
Artificial insemination	2.92±0.45	5	2.91±0.46	5	2.93±0.43	5	-0.82	0.412
Prenatal diagnosis of fetus	3.09±0.42	3	3.11±0.43	3	3.07±0.40	4	1.25	0.212
Right to life of newborn	3.24±0.52	1	3.28±0.52	2	3.19±0.51	1	2.70	0.007
Euthanasia	2.46±0.48	7	2.47±0.51	7	2.45±0.44	7	0.71	0.481
Organ transplantation	3.07±0.45	4	3.06±0.45	4	3.08±0.46	3	-0.79	0.433
Brain death	2.06±0.36	9	2.09±0.35	9	2.02±0.36	9	2.83	0.005
Human biotechnology	2.67±0.36	6	2.68±0.38	6	2.66±0.34	6	-0.65	0.515
Total	2.79±0.24		2.81±0.25		2.76±0.23		2.56	0.011

M±SD :mean±standard deviation

**D. Comparison of Differences in Biomedical Ethics between Freshmen and Senior Health-related Students based on General Characteristics and the Characteristics Related to Biomedical Ethics**

Comparison of differences in biomedical ethics based on subjects' general characteristics is presented in Table 4. In freshmen, male students' score for values of biomedical ethics was 2.72 while female student's score for them was 2.82, showing that female students are more inclined to deontological ethical tendency with statistically significant difference between the two groups (p=0.003). There was also statistically significant difference in values of biomedical ethics depending on subjects' religions (p<0.001). As the result of post test, Christians (2.90 points) had stronger deontological tendency than those without religion (2.71 points).

Statistically significant difference existed in values of biomedical ethics depending on subjects' location of residence (p<0.001). As the result of post test, students living in agricultural and fishing towns (2.92 points) had stronger deontological tendency than those living in large cities (2.78 points). In seniors, there was difference in values of biomedical ethics depending on subjects' participation in clubs (p=0.005) and those participating in clubs (2.80 points) had stronger deontological tendency than those who don't (2.83 points).

Table 4: Comparison of Biomedical Ethical Values by General Characteristics between First Year and Senior Health-related Students (n=811)

Variables	Classification	Freshman (n=476)	t/F (p)	Scheffe	Senior (n=335)	t/F (p)	Scheffe
		M±SD			M±SD		
Gender	Male	2.72±0.27	9.12 (0.003)		2.81±0.24		
	Female	2.82±0.24			2.76±0.23		
Religion	Protestant	2.90±0.27	5.49 (<0.001)	1>4	2.80±0.25		
	Catholic	2.78±0.22			2.84±0.23		
	Buddhist	2.81±0.23			2.69±0.21		
	None	2.71±0.24			2.75±0.23		
	Others	2.75±0.16			2.81±0.29		
Level of participation in religious activity	Most active	2.86±0.28			2.77±0.18		
	Active	2.89±0.26			2.81±0.26		
	Somewhat active	2.82±0.26			2.79±0.25		
	Least active	2.80±0.23			2.75±0.23		
Family numbers' involvement in medical related areas	Yes	2.84±0.25			2.81±0.27		
	No	2.80±0.25			2.76±0.23		
Bioethical related club activity group	Yes	2.80±0.25			2.80±0.24	7.91 (0.005)	
	No	2.83±0.26			2.72±0.22		
Level of participation in campus group activity	Most active	2.81±0.27			2.85±0.24		
	Active	2.81±0.25			2.79±0.23		
	Somewhat active	2.79±0.23			2.74±0.23		
	Least active	2.75±0.24			2.82±0.26		
Types of club activities	Volunteering activity	2.82±0.24			2.79±0.22		
	Hobby	2.76±0.27			2.76±0.25		
	Education & research	2.86±0.24			2.80±0.28		
	Alumni meeting	2.69±0.15			2.62±0.20		
	Others	2.78±0.25			2.85±0.23		
Areas of living	Megalopolis	2.78±0.25	0.79 (<0.001)	3>1,2	2.79±0.22		
	Small town	2.80±0.24			2.74±0.26		
	Rural	2.92±0.25			2.73±0.23		

M±SD :mean±standard deviation

Comparison of differences in biomedical ethics based on subjects' characteristics related to biomedical ethics is presented in Table 5. In freshmen, there was statistically significant difference in the question whether they know about biomedical ethics ( $p=0.024$ ); those who responded 'yes' (2.82 points) had stronger deontological tendency than those who responded 'no' (2.73 points) or those who said they are 'not interested' (2.67 points). There was also statistically significant difference in the question on the degree of establishment of their ethical values ( $p<0.001$ ); as the result of post test, those with firmly-established values (2.91 points) had stronger deontological tendency than those who change according to situations (2.76 points).

There was also statistically significant difference depending on the experience of conflict due to biomedical ethical problems ( $p<0.001$ ); as the result of post test, those with experience of conflict (2.86) had stronger deontological tendency than those without such experiences (2.70). To the question whether subjects had the intention to participate in courses regarding biomedical ethics, there was also statistically significant difference ( $p<0.001$ ); as the result of post test, those who expressed intention to participate (2.85 points) had stronger deontological tendency than those who didn't (2.72 points) and those who are 'not interested' (2.74 points).

There was also statistically significant difference in the question whether there is a possibility that biomedical ethics problems will increase gradually in the future ( $p=0.001$ ); as the result of post test, those who said 'yes' (2.82) had stronger deontological tendency than those who responded 'no' (2.67). In seniors, statistically significant difference existed depending on the methods of acquiring knowledge and information of biomedical ethics ( $p=0.007$ ); as the result of post test, those who acquired them through internet (2.85) had stronger deontological tendency than those who acquired them in school courses (2.51).

There was also statistically significant difference depending on the degree of establishment of ethical values ( $p=0.001$ ); those who responded 'firm in values' (2.87 points) had stronger deontological tendency than those who said 'sometimes confused' (2.78 points), 'it depends on situations' (2.72 points) and 'not interested' (2.50 points) and those who said 'sometimes confused' and 'it depends on situations' had stronger deontological ethical tendency than those who responded 'not interested.'

There was also statistically significant difference in values of biomedical ethics depending on the experience in conflict due to biomedical ethical problems ( $p=0.003$ ); as the result of post test, those who replied 'have experience of conflict' (2.81 points) had stronger deontological tendency than those who said 'no experience' (2.71 points). As to the question whether subjects have the intention to participate in courses regarding biomedical ethics, statistically significant difference existed ( $p=0.014$ ); as the result of post test, those who had the intention to participate (2.79 points) had stronger deontological tendency than those who didn't (2.67 points).

Table 5: Comparison of Health-related Students' Biomedical Ethical Values according to Bio- medical Ethics Related Characteristics between Two Groups (n=811)

Variables	Classification	Freshman (n=476)	t/F (p)	Scheffe	Senior (n=335)	t/F (p)	scheffe
		M±SD			M±SD		
The experience of attending biomedical ethics related classes	Yes	2.82±0.25	3.75 (0.024)	1>2,3	2.77±0.23		
	No	2.73±0.18			2.48±0.13		
	Not interested	2.67±0.29			2.73±0.13		
Main source of acquired information/knowledge on biomedical ethics	TV	2.81±0.23			2.71±0.23	3.22 (0.007)	4>5
	Book, newspaper, magazine	2.84±0.26			2.73±0.26		
	School class	2.82±0.24			2.79±0.22		
	Internet	2.78±0.27			2.85±0.28		
	Training, lecture	2.81±0.33			2.51±0.17		
	Others	2.91±0.34			2.76±0.12		
Self evaluated degree of Ethical values	Very firms	2.91±0.29	8.80 (<0.001)	1>3	2.87±0.29	5.97 (0.001)	1>2,3>4
	Sometimes confused	2.83±0.26			2.78±0.29		
	Depends on the situation	2.76±0.22			2.72±0.22		
	Not realistic	2.71±0.2			2.50±0.00		
Experience of conflicts regarding biomedical ethics	Yes	2.86±0.27	9.97 (<0.001)	1>3	2.81±0.24	5.91 (0.003)	1>2
	No	2.80±0.22			2.71±0.22		
	Not interested	2.70±0.23			2.75±0.23		
Sufficiency of bioethical classes in current educational system	enough	2.82±0.27			2.79±0.23		
	Not enough	2.81±0.24			2.75±0.23		
Possibility of increasing ethical problems according to the development of the life science	Yes	2.82±0.25	7.18 (0.001)	1>2	2.77±0.23		
	No	2.67±0.22			2.67±0.26		
	Not interested	2.69±0.24			2.82±0.21		
Intention to attend on biomedical ethical classes	Yes	2.85±0.25	2.78 (<0.0001)	1>2,3	2.79±0.24	4.32 (0.014)	1>2
	No	2.72±0.25			2.70±0.23		
	Not interested	2.74±0.22			2.74±0.20		

M±SD :mean±standard deviation

#### IV. DISCUSSION

As medical technicians are directly and indirectly exposed to complex ethical problems in clinical situations, firm values of biomedical ethics are more emphasized in medical technic which is closely related to human lives than other areas. Thus, in order to cultivate medical technicians' ability to judge ethical problems during medical technic practice in desirable and wise ways, it is necessary to strengthen their capability to confront and handle ethical problems frequently arising in recent clinical field. Therefore, this study aimed to provide basic material for the right direction in reforming curriculums of health-related departments by analyzing the difference in characteristics of biomedical ethics and ethical tendencies between freshmen and senior students.

To the question regarding the sources of knowledge and information on biomedical ethics, TV was most prevalent in freshmen with 38.2% followed by courses at schools (24.6%), internet (14.9%) and books, magazines and newspapers (10.3%) while, in seniors, courses at school were most dominant with (55.8%) followed by TV (23.0%), various books (11.2%) and internet (8.2%). In sum, freshmen tend to acquire information on biomedical ethics from mass media easily available. This trend reflects the reality that mass media and computers play essential roles in information age and among these, TV is an important reference in forming individual attitude in the short-term and easy way since it is closely related to daily lives of people.<sup>10</sup>

In addition, there's a report that the most widely chosen method of acquiring information by the 20s is mass media and information in mass media affects citizens' consciousness, attitudes and behaviors. Hence, for the education of nursing ethics, this study suggests use of verified TV programs which will arouse the interest of students and help form desirable consciousness of ethics.

In comparison of subjects' characteristics related to biomedical ethics, to the question if the subjects' ethical values are firm, higher proportion of freshmen said 'yes' than seniors and more seniors responded 'sometimes confused' or 'it depends on situations' than freshmen, displaying differences between the two groups ( $p=0.003$ ). To the question whether they have had experience of conflict with biomedical ethical problems, 38.7% of freshmen said 'yes' while 49.9% of seniors did the same, demonstrating that the seniors experience more conflicts related to biomedical ethics.

Reviewing the results of studies with similar purpose to this study, ByungHye Kong (2002) Young Yi Cho & Sung Sook Han (2005) and Soon Hee Lee, Sook Young Kim & Jung Ah Kim (2007) reported that though students of nursing departments experience various events during clinical practice, they face limitations in their ability to confront problems and decision-making with their existing ethical values, leading to serious ethical conflicts.

Solution to this problem is to cultivate the students' ability to confront ethical problems and make desirable decisions, which is possible only with systematic ethical education and training.<sup>11</sup> Senior students in this study experience more conflicts and confusion with the problems related to biomedical ethics, which is deemed to be the result of the exposure to medical ethical problems during their direct and indirect experience of clinical practice as a part of their major. Following studies are required to find out in detail which factors influence more than others.

To the question whether the quality and quantity of biomedical ethics education currently performed are sufficient, 74.8% of the students responded 'insufficient' and to the question whether they have the intention to participate in courses related to biomedical ethics in the future, 64.2% of the students replied 'yes' while 35.8% said 'no' or 'not interested.' Comparing the two groups, those who responded that they will participate were 64.5% of freshmen and 63.9% of seniors while those who will not were 12.6% of freshmen and 17.6% of seniors.

To sum up, although health-related university students think that biomedical problems will gradually increase in the future with the development of bio-science, the number of students who are willing to participate in ethics education to solve this problem decreases as they go up grades. Given the result of the studies that ethical standards are firmly established by the education during university years, this decrease in the intention to participate in ethic education is expected to decrease medical technic competencies and harm development of medical technic occupation due to ethical dilemmas they will face in the future when they will work as medical technicians. Thus, future studies are required to investigate the reasons why the students

refuse to participate in ethical education and to find out measures to correct this situation.

In the comparison on the values of biomedical ethics between the two groups, freshmen had stronger deontological tendency than seniors. A similar study by Soon Hee Lee, Sook Young Kim & Jung Ah Kim (2007) also reported that students without clinical experience had stronger deontological tendency than their counterparts with clinical experiences. In Mee Hwa Park's study,<sup>12</sup> freshmen without clinical experience had deontological tendency followed by utilitarian one as they come to have clinical experience, and after they receive reeducation on ethics, they returned to strong deontological position, exhibiting partial agreement with this study. This can be translated as the result of the confusion in existing ethical standards while experiencing various ethical problems in clinical practice. Thus, longitudinal studies are required to be conducted to see how the same subjects are changing in their biomedical ethics with the passage of time.

In the comparison of sub-domains of biomedical ethics, deontological tendency appeared for both freshmen and seniors in premature baby's right to life, fetus' right to life, diagnosis before birth, organ transplant, artificial insemination and bioengineering, among which there were statistically significant difference in premature baby's right to life and fetus' right to life and freshmen had stronger deontological tendency than seniors. Both groups exhibited utilitarian tendency in artificial abortion, brain death and euthanasia, among which there were statistically significant difference between the two groups in abortion and brain death and seniors had stronger utilitarian tendency than freshmen.

Among the similar studies to this one, while study by Hye Young Ahn et al. (2008) found out deontological tendency in abortion, brain death and euthanasia, which is different from the result of this study, studies by YonnHeeKwon (2009) and Sun JooKwon (2003) supported this study with their findings of the strongest deontological tendency in right to life and utilitarian tendency in abortion. To sum up the results, seniors who had weak deontological tendency in fetus' and premature baby's right to life had stronger utilitarian tendency in abortion and brain death. Even though abortion is illegal and runs counter to the nursing ideology of respect to life, it has been frequently practiced secretly and has been center of controversy for the longest period in human history.<sup>13</sup>

That is, it has been one of the hottest ethical, social and legal topics between liberalism which places more importance on women's right to choose and pursuit of happiness and conservatism which puts respect for life before anything else. It is assumed that though the subjects of this study also recognize the dignity of life, they place more importance on women's right to choose and pursuit of happiness in abortion. Utilitarian tendency was also strong in brain death, which is deemed to be the result of influence from strong social support for 'dignified death' thanks to recent media reports on brain death, clinical experience in the field in which they witnessed the painful efforts of patients' family members to sustain life and ethical conflicts which they have not experienced before such as death.

As for factors influencing values of biomedical ethics, in the general characteristics of freshmen, female students than male students, Christians than those without religions and students living in agricultural and fishing areas and small cities than those in large cities had more deontological tendency. In characteristics related to biomedical ethics, subjects who responded they knew about biomedical ethics than those who didn't or those who were not interested, subjects with firmly-established ethical values than those who change depending on situations, subjects who experienced conflicts with biomedical ethical problems than those without such experiences, subjects who are willing to participate in biomedical ethics courses than those who aren't or are not interested and subjects who predicted that biomedical problems would gradually increase with the development of bioengineering than those who didn't see that way had stronger deontological tendency.

In seniors, factors were confirmed only in characteristics related to biomedical ethics; subjects who acquire knowledge or information on the internet than those who did in school courses and lectures, subjects with firmly-established ethical values than other respondents, subjects who said they are 'confused sometimes' than those who change depending on situations, subjects who experienced conflicts with biomedical ethical problems than those without such experiences, subjects who are willing to participate in biomedical ethics courses than those who aren't had stronger deontological tendency.

Both groups had it in common that those with firm ethical values, those who have experienced conflicts in biomedical ethical problems and those who had the intention to participate in courses regarding biomedical ethics had stronger deontological tendency, which is supported by studies by Yoon HeeKwon (2009), Hye

Young Ahn et al. (2008) and Joo Young Ha et al. (2009). Hence, it is assumed that ethical education during university years has positive effect on the reestablishment of ethical values for students. Especially, since many studies suggest that subjects experience confusion and conflict in ethical standards and values previously held due to direct and indirect experience of biomedical ethical problems during the course of clinical practice, it is important that following future studies will conduct researches on how the ethical values and causes of conflict of same subjects change by period.

From the result of this study, it was verified that those without firm ethical values not only experience more ethical conflicts but they can also newly establish ethical standards during the course of conflicts in ethical problems. Many studies have reported that ethical values are not formed in the short-term but established and acquired through environment and education during the course of an individual<sup>14</sup> and systematic ethical education during university is very effective.<sup>15</sup> Yet, as current ethic education is conducted in only one semester in early year of university, junior and senior students who undergo ethical conflicts experience confusion in ethical decision-making, which leads to difficulty in objective and rational judgment. Thus, it is necessary to prepare for systematic and continuous ethical education for each year of university and efforts should be made to cultivate students' ability to reasonably analyze and settle problems through practical and detailed situations.

## V. CONCLUSION AND SUGGESTION

The purpose of this study was to suggest directions for medical technic ethics education by comparing the characteristics of biomedical ethics and ethical tendencies between freshmen and senior health-related university students.

For data collection, the researcher visited 6 health-related departments of universities in G provinces from May 26 through June 14, 2016 and explained the purpose of this study, contents and the methods to fill out the questionnaires and selected willing students by convenience sampling. Final participating subjects were 476 freshmen and 335 seniors.

Questionnaire was composed of questions regarding general characteristics, characteristics related to biomedical ethics and values of biomedical ethics and data were analyzed with frequency analysis,  $\chi^2$ -test, t-test, One-way ANOVA, Scheffe test by using SPSS window version 17.0 statistical program.

The results of this study are as follows;

First, in the comparison of subjects' values of biomedical ethics, freshmen had stronger deontological ethical tendency. In the sub-domains, deontological tendency appeared for both freshmen and seniors in fetus' right to life, artificial insemination, diagnosis before birth, premature baby's right to life, organ transplant, and bioengineering while both groups exhibited utilitarian tendency in artificial abortion, euthanasia and brain death.

There were statistically significant difference in premature baby's right to life and fetus' right to life for both of which freshmen had stronger deontological tendency than seniors while, for abortion and brain death, seniors had stronger utilitarian tendency than freshmen.

Second, in the comparison of values of biomedical ethics based on subjects' general characteristics, in freshmen, deontological tendency was stronger in female students than male counterparts, Christians than those without religions, students living in agricultural or fishing towns and small cities than those living in large cities while, in seniors, deontological tendency was stronger in the students who participated in club activities than those who didn't.

Third, in the comparison of values of biomedical ethics based on the characteristics related to biomedical ethics, in freshmen, subjects who responded they knew about biomedical ethics, subjects with firmly-established ethical values, subjects who experienced conflicts with biomedical ethical problems, subjects who are willing to participate in biomedical ethics courses and subjects who predicted that biomedical problems would gradually increase with the development of bioengineering had stronger deontological tendency. In seniors, subjects who acquire knowledge or information on the internet, subjects with firmly-established ethical values, subjects who have experienced conflicts with biomedical ethical problems and subjects who are willing to participate in biomedical ethics courses had stronger deontological tendency. Therefore, it is necessary to set directions based on the characteristics of each grade when developing educational programs or organizing courses on medical technic ethics for the establishment of students' biomedical values. Based

on these results, this study makes following suggestions;

First, repetitive studies in the same tools and methods with increased samples are required to generalize study results.

Second, longitudinal studies are required to confirm how the same subjects' biomedical values change over the passage of time.

Third, standardized tool are required to be developed for research on biomedical values.

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## A Study on the Contextual Information Sharing System for the Provide Matched Information through Contextual Data from Multi-Users

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### Abstract---

**Objectives:** In the era of Internet of Things (IoT), personalized services are becoming more popular. For customized services, the system must generate useful contextual information and share the context data collected from each individual.

**Methods/Statistical analysis:** In this paper, we suggested contextual information sharing system to generate context information by matching gathered context data from multi-users. Also, it can to share context information.

**Findings:** Contextual information sharing system proposed in this paper can generate context information and provide the related users with context information services by matching context data obtained from multi-users beyond existing systems which provided context data based on context information of a single user.

**Improvements/Applications:** The system is extension version that from the existing research, which used data sensed from a single user to generate the context information, multi-users related can utilize the service.

**Keywords---** Context Information Sharing System, Internet of Things, Context-Awareness, Multi User, Context Information Matching.

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## I. INTRODUCTION

Recently, research on IoT (Internet of Things) technology is under way by developing sensor network technology. IoT is a technology of connecting various objects equipped with sensors and communication devices to Internet. Existing Contextual information sharing systems depended on context information of each single user. Accordingly, it is necessary to generate context information by matching the context data acquired from multiple users, and to provide context information to related users<sup>1</sup>.

The context information sharing system generates raw data in real time through each portable terminal. And we must create useful information by matching various context data. Therefore, it is necessary to be able to filter unnecessary data from large amount of data. In addition, the context information generated in the contextual information sharing system has to establish a system that enable provide context information created data through the monitoring system to users<sup>2</sup>.

In this paper, we propose a contextual information sharing system that generates context information by matching the context data collected from multiple users. Also, context information can be shared.

## II. RELATED RESEARCH

In software programming circle, programmers have had the concept that they need to develop a context-awareness application<sup>3</sup>. Context can be defined as peripheral circumstance or fact, which is comprised of event, opinion, situation, and thought<sup>4</sup>. A context-awareness application finds out information of who, what, where, and when and a software developer uses this background information to determine what and why a context happens and encodes the data in the application<sup>5,6</sup>. Based on this definition of context, the context-awareness consists of 4 categories of important information: 'Location', 'Identity', 'Time', and 'Activity'. A lot of technologies related to IoT and contextual awareness system have lately been researched and developed, and various services are being commercialized on the basis of such technologies<sup>7,8</sup>.

In the study of Song, Kim(2016), it was said context-awareness systems should investigate when, where, who, how, why, and what it works and by utilizing this background information establish matching algorithm that can decide why any context is happening<sup>9</sup>.

In the study of the Seo and Kim(2012), it was generated the user's position and moving speed information using user's location and moving speed information. We also proposed a system that recommends a restaurant appropriate to the user's situation<sup>10</sup>. This system is generated the context information to match the context data generated from a single user(Figure 1). However, there is a problem that did not take into account the situation of the restaurant.

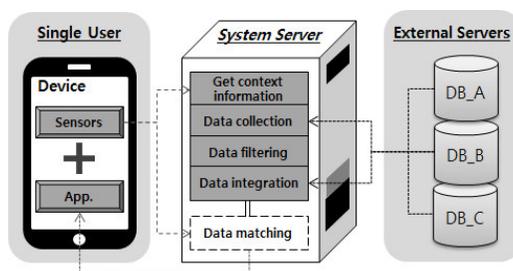


Figure 1: The Research of Context-awareness System for Single User

Under the IoT environment, the context data sensed from multi-users must be included because all users and things are connected to sensors. And because another point of view of the user, 'restaurant', can include changing context information such as position information caused by the characteristics of the removable store, the waiting time, and daily recommended menu.

In this paper, we proposed the system that can generate context information by matching context data from multi-users, and provide the service by sharing generated context information to information providers.

## III. SYSTEM MODELING

As suggested in Figure 2, Multi-users participating in the contextual information sharing system proposed in this paper will be divided into Group A, Group B and Group C depending on their role. For example, users of

the Group A are undergo restaurant recommendations, Group B is the set of restaurants, and the Group C may be a service provider that generates the events such as advertisements between them. The users can access the Big Data generating in the system. The users can access the Big Data generating in the system. Group A includes various users, such as  $a_1, a_2, \dots, a_n$  and the other groups are also formed in this way. The context-awareness data  $c\_Adata(a_i)$  and  $c\_Bdata(a_i)$  of  $a_i$  are stored in the DB\_A and DB\_B through recognized by the mobile device. Finally, it stored in DB\_M after generating the new context-awareness information through data matching algorithm in the server.

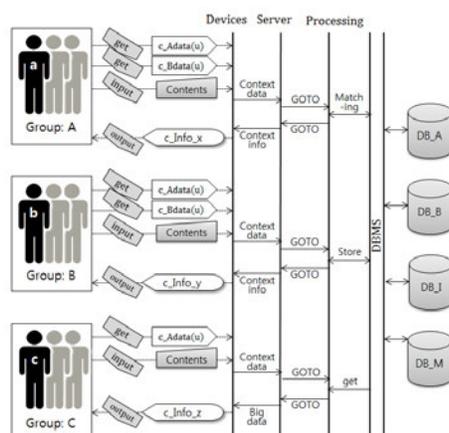


Figure 2: The Flow of Context-awareness Information Sharing System for Multi Users

In addition, the user may input the required status information. This is a feature that allows you to utilize information that is appropriate for your needs. For example, a user of Group A input his preferred menu, and Group B can inputs today's recommended menu and discount items. The input information is stored in the DB\_I.

Context data of the users belonging to each group sends the information and services required by each type of the user group after generating context-awareness information through the data matching in the server.

The structure of contextual information sharing system is shown in Figure 3. The server is composed of ContextA\_Processor, ContextB\_Processor, InputData\_Processor.

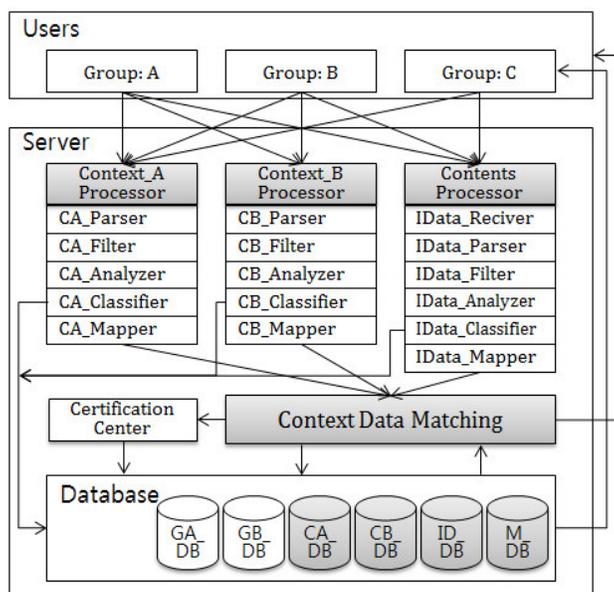


Figure 3: The Structure of Context Awareness Information Sharing System for Multi Users

Collected context data from users are divided into CA(ContextA) and CB(ContextB). For example, CA is the position data, and CB is the moving speed data each other. When the location data  $c\_Adata(a_i)$  of a user  $a_i$  are sensed, only the useful data are extracted out of CA\_Filter after separating the data format from CA\_Parser of CA\_Processor. Extracted data generate meaningful data in the CA\_Analyzer, and the analyzed data here are stored in the database through CA\_Classfier. In the CA Mapper, mapping among optimized context data is carried out and matched data processed through the context data matching algorithm are sent to the user. The ID (Input Data) that process data input by the user directly are input through ID\_Receiver of ID\_Processor and adjusted to a fixed format in the ID\_Parser or divided into the meaningful units.

Group C is a group which wants to access the information generated inside the system and acquire new information through the stored big data. Information inside the system may include sensitive data such as private information, and authentication procedure should be required in order to access it. Context information to meet specific requirements can be used for user authentication. When the user  $c_i$  is assumed to have permission to access the DB only in the specific position, the user access is permitted if only data values of both the sensed  $c\_Adata(c_i)$  and Certification Center match.

#### IV. SYSTEM ALGORITHM

Figure 4 is an algorithm which matches context data and input data of the users of Group A(GA) and Group B(GB). CA receives the location information, and CB receives the speed information. Distance is generated based on the position information of the CA, and when CB is more than 15km/h, it is considered that a mobile device is used. When the server obtains the CA and CB, it considers the user's speed information. If the user is using the mobile device, the user of the Group B within a 10km distance with the user in GB\_DB is filtered as GB'. Thereafter, data mapped to the input data of GA from the input data of the GB' are filtered. When filtered data match input date of GA, they are sent to  $a_i$  of the GA.

```

switch (getCA&&getCB)
case speed>15:
    select where distance>0 && distance<10 from GB_DB;
    select where GAInputData from GB`InputData;
    if (GAInputData==GB`InputData)
        send(InputData.GB`InputData);
    else
        break;
    break;
case speed<15:
    select where distance<2 from GB_DB;
    select where GAInputData from GB`InputData;
    if (GAInputData==GB`InputData)
        send(InputData.GB`InputData);
    else
        break;
    break;
end switch;
    
```

Figure 4: Context Information Matching Algorithm

#### V. SIMULATION TEST

In this paper, we propose the necessity of system using multi-user contextual information. We also proposed the system structure through algorithm development. The proposed system should be able to process and transmit the situation collected from multiple users to each user's needs. The proposed system can interwork with various kinds of sensors. However, simulation testing has added a way for users to input their own situation, as the system must be able to filter out and match various situations. Basically, I used a beacon sensor to get the user's location information. I used RAD Studio software to set up and control the beacon. The user device used in the test is an Android-based device.

The simulation is shown in Table 1. User roles are divided as follows: Group A is "Seller", Group B is "Buyer", and Group C is able to know the user's movement and distance in the market, it can be "Manager". User A is in a fixed location, that is, the location of the building. User A` and User A`` were set as mobile stores and constantly changed the location data. We set the sales products to xx, yy, and zz. And then, we set up a random change in the quantity available and the possibility of waiting. If the proposed system is applied to a restaurant, it can be set to empty tables and allowable number per table. We assumed that User B wanted to

buy four items of xx, without waiting.

Table 1: System Simulation in Context of Groups

Division	User Name	Role	Context				Requirements
			Location	Goods	Quantity	Waiting	
Group A	User A	Seller	Fixing	xx/yy/zz	4	P	-
	User A'	Seller	Moving	xx/yy	2	N	-
	User A''	Seller	Moving	xx/zz	4	N	-
Group B	User B	Buyer	Moving	-	-	-	xx/4/N
Group C	User C	Manager	Fixing	-	-	-	All events

As shown in Figure 5, through the system prototype application, the list of User B changes according to the situation of Group A.



(a) System Prototype (b) Application Algorithm Testing

Figure 5: System Simulation Monitoring

## VI. CONCLUSION

In this paper, we proposed the system that can generate context information by matching context data generated from multi-users, and utilize the service by sharing the generated context information with all the information providers. In this paper, the system is extension version that from the existing research, which used data sensed from a single user to generate the context information, multi-users related can utilize the service. In the future, the system proposed in this paper should enhance the reliability through a variety of tests. Also, it is necessary to study for the generation and utilization of context information in various fields under the IoT environment.

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## The Effects of Proprioceptive Training and Ankle Strengthening Exercise on Ability of Shooting Performance for Soccer Players

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### Abstract---

**Background/Objective:** The purpose of this study was to show the effects of proprioceptive training and ankle strengthening exercise on in-step shooting speed and accuracy for soccer players.

**Methods/Statistical analysis:** Ten high school soccer players were participated in this study. All subjects performed specific exercise program including proprioceptive and ankle strengthening training with three times per week for 8 weeks and were evaluated instep shooting speed, accuracy of instep kick, isokinetic strengthen test and balance test before and after the intervention. Paired sample t-test was used to compare with the results and all data was analyzed using Window SPSS 12.0.

**Findings:** In the present result, instep shooting speed was showed that the speed was significantly increased than pre-intervention in all soccer players ( $p < .01$ ). The average ball speed was improved from  $96.42 \pm 4.88$  to  $99.88 \pm 5.95$  km/h. The accuracy of instep kick was also improved significantly in all soccer players ( $p < .001$ ). The average accuracy was improved from  $393.53 \pm 53$  to  $292.45 \pm 86.00$  cm. In ankle muscles strength, the strengthening of evertor and invertor were enhanced after intervention. Balance ability was checked using Biodex balance machine and showed that overall balance index in right was improved from  $4.07 \pm 1.06$  to  $1.89 \pm 1.45$ , even in left was improved from  $3.46 \pm 1.07$  to  $1.48 \pm 0.43$ .

**Improvement/Application:** These findings indicate that proprioceptive training and ankle strengthening exercise could be effective in improving instep shooting performance for elite soccer players with high school.

**Keywords---** Proprioceptive Training, Ankle Strengthening Exercise, Ball Speed, Accuracy of Kick, Soccer Players.

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## I. INTRODUCTION

Competition games of soccer and the team with more shooting has better chances to win the game. Among the various kicks such as inside, instep, outside and in-front, an instep kick is common used to get a goal and depends on various factors including the distance of the kick from the goal, the air resistance and the technique of the main kick<sup>1</sup>. For enhancing an instep kick and shooting, soccer players perform an approach to the ball and place their supported foot closer to the ball. Finally, kicking the ball with greater pelvic tilt and greater knee extension of the kicking leg is an important factor for enhancing the ball speed. Specifically, higher speed of the foot and a smaller distance between the ball and the support leg contribute to a higher speed of the ball. The maximal ball speed is achieved by enhancing leg strength and power in kicking success and it is associated with muscle strength and power of the players<sup>2</sup>.

The most of soccer players are used to their lower limbs unilaterally in almost all kick and shooting and this can be altered the strength balance between the two extremities, leading to injury during the performance. Previous study<sup>3</sup> demonstrated that 82% of 398 players were injured during the observation period of 1 year and poor endurance of several risk factors was also an important role to increase injury incidence. Muscle strength in ankle joint has a crucial role to enhancing soccer performance and stability when player was shooting a ball. Previous study<sup>4</sup> demonstrated that strength of lower extremity and kicking ability are an important factors, which are related with improvement of kicking performance.

Specific balance training program applied in young soccer players can improve their proprioception. It can be also prevent lower limbs injuries from competition games<sup>5</sup>. The loss of proprioceptive ability in soccer players is associated with the weakness of ankle muscles strengthening, leading to reduce sports performance like kick and pass a ball<sup>6</sup>. Exercise training for improving balance ability was recommended that isokinetic strengthening exercise for the ankle joint needed to improve athletic performance and to prevent ankle injury in field hockey player; similar to soccer<sup>7</sup>.

Exercise therapy for soccer players has been tried to enhance exercise performance and prevent injury in competing game. Several studies<sup>2, 8-11</sup> were demonstrated that exercise therapy is benefit input to improve explosive strength, kicking speed and preventing injury. However, these studies were only applied a one parameter to soccer players for confirming the effects of intervention even though proprioceptive training and ankle strengthening were very important factor in soccer players.

Therefore, the purpose of this study was to estimate the effects of combined exercise program including proprioceptive training and ankle strengthening on soccer performance in elite soccer players.

## II. MATERIALS

10 soccer players who belong to N high school participated in this study. Each subject provided written informed consent for participation before this study. Each participant performed kick and shooting with the dominant leg. 2 subjects in this study were dropped out due to surgery and transfer to another school, respectively. So, 8 students were involved final analysis for this study.

All subject performed a specific warm-up including stretching and sport related activities for preventing injury during the test for 30min. In speed evaluation, instep shooting was conducted in ground and the distance for shooting is 11m from the goalpost. The subjects performed 5 times trials and had resting time for 10mins between each trials. The ball speed was measured using a speed gun Stalker Pro (Applied concepts, INC., USA) at 2 m from goalpost behind. The higher score means the higher fast. The results was record the higher score and score of average value of 5 trails.

The accuracy of instep kick was measured as distance between kick stage and targeting cone. The distance between kick stage and targeting cone was 30m. For evaluating accuracy, a measuring tape was used and measured the distance from the targeting cone. The subjects performed 5 times trials and had resting time for 10mins between each trials. The distance from kick stage to targeting cone was recorded as results of accuracy, and average value of 5 trails.

Isokinetic machine can be used to evaluation and exercise for muscle performance and also was provided objective and exact results to clinical specialist<sup>6</sup>. In this study, we used an isokinetic machine (Biodex Medical Systems Inc., Shirley, USA) to evaluate ankle muscle strengthening. The test speed for evaluating parameters including peak toque, total work and average power was referred as previous study<sup>13</sup>. The subjects were

instructed to at least 3 practical trails before actual test at 30°/sec and 120°/sec angular speed. For the strength test, four trials were conducted at 30°/sec and ten trials were performed at 120°/sec for the endurance test. The uninjured leg was evaluated firstly and followed by injured leg. All test was conducted by same examiner and a resting time of 20sec for this test was given between two speeds.

The balance ability test was carried out using the Biodex stability system (Biodex, Inc, Shirley, USA) by one tester for all subjects. The machine was proved to reliability from previous study conducted by Arnold BL et al<sup>14</sup>. The subjects stand on the machine with one leg stand and calibrated center of gravity on the machine. The test then was conducted according to instability protocols that were eight (more stable) and level two (less stable). In this test, three stability parameters were checked; anteroposterior, mediolateral and general stability index. This test also was conducted firstly in uninjured leg.

This combined exercise programs was modified by considering the previous study for enhancing balance and strengthening and consists of 5 proprioceptive training and 5 ankle strengthening exercise. Participants are thoroughly and identically supervised by athletic trainer and performed in a same circumstance. All subjects performed the programs with 3 times per week for 8 weeks. Table 1 and Table 2

Table 1: Proprioceptive Training

Name of exercise training	Exercisetime	Resting time
Single leg stand with open eye	30sec	30sec
Single leg stand with closed eye	30sec	30sec
Single leg stand with swing leg	45sec	15sec
Single leg stand with kick ball	45sec	15sec
Single leg stand with heading	45sec	15sec

Table 2: Ankle Strengthening Exercise

Name of exercise training	Exerciseintensity	Resting time
Ankle circle	30sec	30sec
Standing heel raise	20repetition / 2sets	30sec
Standing toes raise	20repetition / 2sets	30sec
Squeezing ball	10repetition / 3sets	30sec
Push ball outward	10repetition / 3sets	30sec

All data objected from this study was processed using the statistical program SPSS 12.0 and were expressed as the mean (M) and standard deviation (SD). To identify the effect of intervention, paired t-test was used. All level of statistical significance were showed as p=0.05.

### III. RESULTS

Maximal and average speed were significant improved after intervention (p<.001) and the distance of maximal and average accuracy also were decreased significantly after intervention (p<.001). The results was showed as follows. Table 3

In strengthening of ankle invertor; total work and average power were significantly increased at 30°/sec and 120°/sec in right side (p<.01). Addition, peak toque at 120°/sec was only improved significantly after intervention (p<.01). In left side, peak toque and total work were significantly improved at 120°/sec (p<.01). Table 4

In strengthening of ankle evertor; peak toque and total work in right and left ankle were significantly improved at 30°/sec and 120°/sec (p<.01).Average power was increased compared with before intervention but not significant change. Table 5

After intervention, balance ability was significantly improved in all variables including overall balance index, anterior/posterior index and medial/lateral index at right and left ankle (p<0.01). Table 6

Table 3: Instep Shooting Speed and Accuracy of Kick After Intervention

Variables	Pre	Post	F-value	P-value
Maximal speed	101.49±3.29	107.25±4.23	-7.293	0.000***
Average speed	96.42±4.88	99.88±5.95	-5.237	0.01**
Maximal accuracy	154.50±80.83	79.75±58.69	3.265	0.014*
Average accuracy	393.53±59.77	292.45±86.00	5.738	0.001***

\*p<.05, \*\*p<.01, \*\*\*p<.001

Table 4: Strengthening for Ankle Invertor

	Degree/sec	Pre	Post	F-value	P-value
RIGHT	30deg/sec PT	37.68±6.64	43.96±10.88	-2.219	0.062
	30deg/sec TW	77.18±10.3	120.35±34.73	-3.706	0.008**
	30deg/sec AP	8.98±1.35	10.70±2.03	-3.456	0.011**
	120deg/sec PT	24.75±5.37	38.74±6.87	-4.966	0.002**
	120deg/sec TW	146.73±33.83	247.59±49.46	-4.584	0.003*
	120deg/sec AP	21.34±6.32	30.09±5.98	-3.556	0.009**
LEFT	30deg/sec PT	43.36±7.38	41.06±10.4	0.729	0.490
	30deg/sec TW	86.11±9.90	110.91±31.24	-2.249	0.059
	30deg/sec AP	9.95±1.2	10.06±2.1	-0.132	0.899
	120deg/sec PT	29.18±8.06	37.42±10.49	-3.564	0.009**
	120deg/sec TW	175.57±38.78	230.95±62.15	-4.332	0.003**
	120deg/sec AP	25.98±6.82	27.45±6.85	-1.178	0.129

\*\*p<.01

PT=PeakTorque (Nm),TW =Total Work, AP=AveragePower

Table 5: Strengthening for Ankle Evertor

	Degree/sec	Pre	Post	F-value	P-value
RIGHT	30deg/sec PT	28.20±5.80	41.23±8.41	-4.095	0.005**
	30deg/sec TW	74.78±13.45	105.09±31.78	-2.491	0.042**
	30deg/sec AP	8.20±1.6	8.90±1.76	-0.949	0.374
	120deg/sec PT	18.93±4.4	32.49±9.48	-4.064	0.005**
	120deg/sec TW	133.39±31.03	203.76±52.16	-3.363	0.012**
	120deg/sec AP	19.46±5.63	24.48±4.74	-2.199	0.064
LEFT	30deg/sec PT	23.38±5.53	33.86±10.74	-2.75	0.028**
	30deg/sec TW	70.36±14.72	96.90±21.43	-3.12	0.017**
	30deg/sec AP	7.55±1.36	8.17±1.1	-1.18	0.276
	120deg/sec PT	17.84±3.96	27.45±4.94	-4.265	0.004**
	120deg/sec TW	125.16±30.65	178.01±27.59	-4.123	0.004**
	120deg/sec AP	18.65±5.22	21.02±2.81	-1.899	0.09

\*\*p<.01

PT=PeakTorque (Nm),TW =TotalWork,AP=AveragePower

Table 6: Balance Ability Before and After Intervention

	Actual values	Pre	Post	F-value	P-value
RIGHT	Overall balance index	4.07±1.06	1.89±0.45	4.813	0.002**
	Anterior/posterior index	3.59±1.06	1.51±0.39	4.892	0.002**
	Medial/lateral index	2.11±0.67	1.30±0.42	3.541	0.009**
LEFT	Overall balance index	3.46±1.07	1.48±0.43	4.730	0.002**
	Anterior/posterior index	2.94±1.09	1.24±0.3	4.464	0.003**
	Medial/lateral index	1.99±0.74	1.07±0.21	3.095	0.017*

\*p<.05, \*\*p<.01

#### IV. DISCUSSION

The purpose of this investigation was to evaluate the effects of combined exercise programs for soccer performance when the programs was applied for elite soccer players.

The instep kick is a basic element of a soccer game to win the competition. Variations of the instep kick are often used in soccer, such as passing the ball and shooting at the goal, and performing penalty kick<sup>1</sup>.

Soccer practice suggests that a soccer player needs to develop a level of maximum strength and power, which is utilized effectively within the game. For enhancing the soccer performance, the lower extremity and kicking ability were improved using the specific intervention programs <sup>4</sup>.

Previous study <sup>2</sup> demonstrated that application of the training programs using soccer-specific strength exercises would be particularly effective in improving of soccer kick performance. The results of previous study is similar with our present study.

In conclusion, combined exercise program for elite soccer players is an effective approach to improve the speed of instep shooting and accuracy of instep kick.

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## Knowledge of Research Ethics among Public Health Graduate Students

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### Abstract---

**Objectives:** This study aimed to identify the level of awareness, self-efficacy, and knowledge of research ethics among public health graduate students.

**Methods/Statistical analysis:** A descriptive survey design was used. A total of 102 public health graduate students were recruited from one public health school in Korea. Data collection instruments were developed based on the core instructional areas of Responsible Conduct of Research (RCR) from the Office of Research Integrity at the research team's institution. Participants completed a self-reported questionnaire consisting of questions on research ethics. The data were analyzed with descriptive statistics using PASW Statistics 18.0 Window program.

**Findings:** Participants (mean age=31 years) consisted of master's (77.5%) and doctoral (22.5%) level students. Only 25.5% of participants had taken a course in research ethics, and 26.5% of participants had experience conducting research as principle investigators. The level of awareness (mean score 2.91 out of 5) and self-efficacy for good research practice (3.15 out of 5) were moderate. The level of knowledge regarding research ethics was low (10.59 out of 16). The area of lowest awareness was 'protection of intellectual property and patents,' followed by 'justifying authorship'; the area of least knowledge was 'writing research articles,' followed by 'criteria for authorship.' Statistically significant correlations were found between awareness, self-efficacy, and knowledge of research ethics (all  $p < 0.05$ ).

**Improvements/Applications:** These results support the conclusion that educational programs for knowledge of research ethics for graduate public health students are needed in order to help students conduct ethically sound research.

**Keywords---** Awareness, Self-efficacy, Knowledge, Public Health Graduate Students, Research Ethics, Justifying Authorship.

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## **I. INTRODUCTION**

### **A. Necessity of Study**

Public health science is a human science based on the understanding of human phenomena and a practical science to change the phenomena.<sup>1</sup> Studies of public health science mainly deal with understanding of human responses related to health and changing human phenomena related to overall human problems. In performing researches in public health science, research ethics is especially important to respect and protect its subject humans and sincerely conduct scientific researches. In Korea, there has been rapid expansion of researches (with consistent performance of researches) by the graduates of master's and doctoral courses over the last 3 decades.

Yet, awareness and culture regarding research ethics of public health researchers in Korea who conduct numerous researches on public health and human subjects are still deemed to be inadequate. First, it has been reported that subscription regulations of academic public health science journals do not emphasize ethicality of researches and printed theses rarely mention it as well.<sup>2</sup> Second, in the case of education on research ethics, surveys showed that only a few professors of public health departments performed education on research ethics for average 2 hours and, as a result, half of public health graduate students do not have enough understanding of such basic ethical concepts as Belmont doctrine, forgery, falsification and plagiarism and express the need for education on research ethics.<sup>3</sup>

Although the level of awareness, self-efficacy and knowledge of research ethics in current generation of public health scientists who are to publish theses on public health science will have great effect on the observance of research ethics in their theses, little is known about preceding researches and studies. Therefore, this study aimed to investigate the public health graduate students' level of awareness, self-efficacy and knowledge of research ethics which they should be equipped with as responsible researchers who conduct researches on humans and to provide basic material for the development of programs to enhance research ethics of graduate students majoring in public health science.

### **B. Purpose of the Study**

The purpose of this study was to investigate the public health graduate students' level of awareness, self-efficacy and knowledge of research ethics which they should be equipped with as responsible researchers who conduct researches on humans and to provide basic material for the development of program to enhance research ethics of public health graduate students.

Detailed purposes of this study are as follows;

- To investigate the public health graduate students' level of awareness, self-efficacy and knowledge of research ethics
- To compare the public health graduate students' difference in level of awareness, self-efficacy and knowledge of research ethics based on their characteristics
- To investigate the relationship among public health graduate students' level of awareness, self-efficacy and knowledge on research ethics

## **II. SUBJECTS AND METHODS**

### **A. Study Design**

This study is a cross-sectional and descriptive research to investigate the public health graduate students' level of awareness, self-efficacy and knowledge of research ethics.

### **B. Study Subjects**

The subjects of this study were graduate students who were on or completed master's or doctoral course in a university in Korea, voluntarily agreed to participate in this study selected by convenience sampling and wrote letter of agreement in writing. Since the number of the students required was calculated to be minimum 84 by using G power 3.0 (Heinrich-Heine-Universitat, Dusseldorf, Germany) program based on Cohen's formula for power analysis with effect size of 0.20, significance level ( $\alpha$ ) of 0.05 and power of test ( $1-\beta$ ) of 0.80. A total of 110 questionnaires were distributed and, among them, 105 questionnaires were collected (collection rate: 95%). Finally, except for 3 ones with incomplete answers, a total of 102 questionnaires were analyzed and thus, the size of the sample in this study was large enough to statistically

confirm the relationship among variables.

### **C. Study Tools**

In order to investigate the public health graduate students' level of awareness, self-efficacy and knowledge of research ethics, self-administered questionnaires were used which were based on 9 core areas of Responsible Conduct of Research (RCR) suggested by National Science Foundation and Association of Graduate School in the U.S., which were acquisition, management, sharing and possession of data, responsibilities of mentor and educator, publishing behavior and being responsible authors, screening of colleagues, cooperative researches, protection of research subjects, researches on animals, misconduct in researches, conflict of interests and responsibilities, which our research team modified and complemented to fit the characteristics of public health research ethics. Face validity of the study was secured by having the contents reviewed by 3 professors of public health department and 3 students in doctoral course. This tool was composed of a total of 34 questions; specifically, researcher's awareness of research ethics (12 questions), self-efficacy to conduct ethical researches (7 questions) and knowledge of research ethics (16 questions). Details are as follows;

#### **a. Awareness of Research Ethics**

Tool for awareness of research ethics was composed of a total of 12 questions such as 'standards for good researches', 'being a responsible author', 'protection of research subjects', 'misconduct in researches', 'management of data' and 'preparation for Institutional Review.' Each question was constructed with 5-point scale ('knows very well'=5 points, 'moderate'=3 points, 'not know at all'=1 point). The higher the score is, the higher the level of awareness on research ethics. Value of Cronbach's alpha for reliability of internal consistency of this tool was 0.95.

#### **b. Self-efficacy to Conduct Ethical Researches**

Measuring tool for self-efficacy of researcher's ability to conduct ethical researches was composed of a total of 7 questions, which were 'ethical decision-making ability', 'critical thinking and problem-solving ability', 'conflict-resolving ability', 'mediation and coordination ability', 'stress management ability' and 'communication ability' and each question was constructed with 5-point scale ('very strong'=5 points, 'moderate'=3 points, 'not know at all'=1 point). The higher the score is, the higher the level of ability to conduct ethical researches recognized by the subjects. Value of Cronbach's alpha for reliability of internal consistency of this tool was 0.94.

#### **c. Knowledge of Research Ethics**

Tool to measure knowledge of research ethics was composed of a total of 16 questions, which were 1 question on voluntary agreement, 7 questions on misconduct in researches, 2 questions on correct statistical treatment, 1 question on data management, 2 questions on being an author, 2 questions on publication ethics and 1 question on the protection of research subjects. Each question was constructed to answer 'yes' or 'no.' Right answer for each question was given 1 point and wrong answer '0' point, and total score was calculated. The range of score was 0-16 and the higher the score, the higher the level of knowledge.

#### **d. General Characteristics**

In order to find out study subjects' general characteristics, a total of 7 questions were prepared on gender, age, kind of graduate course and semester, type of institutions to which subjects currently belong, research experience, experience of having taken ethics courses and experience of having published a thesis.

### **D. Procedure of Data Collection and Ethical Considerations**

This study was approved by the Institutional Review Board of a university before data collection. In order to promote research subjects' voluntary participation, emails containing the purpose and schedule of ethics education on public health researches to public health graduate students of a university and posters were prepared and posted on the 7 spots within the campus. The research head explained purpose, necessity and process of this study, method of data collection, use of data, guarantee of anonymity and possible retraction anytime if desired to the subjects and had them sign letter of agreement specifying above contents. Research assistant(s) distributed questionnaires and collected them by installing a collection box and to raise the rate of return, reminding emails were sent to all subjects.

### E. Data Analysis

Collected questionnaire data was coded and analyzed by using PASW Statistic 18.0 Window (SPSS, Chicago, IL, USA) program. Subjects' general characteristics, awareness of research ethics, self-efficacy and level of knowledge were analyzed with technical statistics such as frequency, percentage, mean and standard deviation respectively. For awareness of research ethics and self-efficacy, mean and standard deviation were acquired for all subjects and for level of knowledge, rate of correct answer and number of respondents were counted. For differences among variables based on general characteristics, t-test analysis was performed by characteristic of each variable. The relationship among awareness of research ethics, self-efficacy and level of knowledge was analyzed with Pearson's correlation coefficients and significance level for statistical verification was set at 0.05.

## III. RESULTS

### A. Subjects' General and Clinical Characteristics

Majority of subjects in this study were women (99%, n=101) with mean age of 31.0 ( $\pm 4.3$ ). 45.1% (n=46) of them were on graduate course for raising public health researchers and educators while 54.9% (n=56) were on public health graduate course to raise professional medical technicians as clinical experts. 77.5% (n=79) of the subjects were on master's course and half (64.7%, n=66) were currently working in medical institutions. 57.8% (n=59) responded they had research experience with mean of 2.2 times. 24.5% (n=25) had experience of having published theses with mean of 1.9 times. In the meantime, 74.5% (n=76) have not taken research ethics courses <Table 1>.

Table 1: Subjects' General Characteristics(n=102)

Items (Mean $\pm$ SD)	Classification	n	%
Gender	Female	101	99.0
	Male	1	1.0
Age (31.0 $\pm$ 4.3 years)			
Course	General graduate course	46	45.1
	Nursing graduate school	56	54.9
Level of education	Master's course	79	77.5
	1st-2nd semester	46	58.2
	Over 3rd semester	33	41.8
	Doctoral course	23	22.5
	1st-2nd semester	12	52.2
	Over 3rd semester	11	47.8
employment	Medical institutions	66	64.7
	Universities and research institutes	31	30.4
	Local community, etc.	5	4.9
Research experiences (2.24 $\pm$ 1.48 times)	Yes	59	57.8
	Research head	27	45.7
	Joint researcher	25	42.4
	Others (partial participation)	7	11.9
	No	43	42.2
Experience of having published theses (1.92 $\pm$ 1.22 times)	Yes	25	24.5
	No	77	75.5
Experience of having taken research ethics courses (1.39 $\pm$ 0.64 times)	Yes	26	25.5
	No	76	74.5

SD: Standard deviation

### B. Subjects' Level of Awareness, Self-efficacy and Knowledge of Research Ethics

#### a. Level of Awareness of Research Ethics

Level of awareness of research ethics recorded overall mean of 2.91 (standard deviation, SD=0.89), which is lower than 'moderate.' In detail items, 'protection of research subjects and guarantee of confidentiality' was

the highest with mean of 3.71 points (1.15) followed by misconduct in research with 3.23 points (1.06) and copyright of the research with 3.22 points (1.17). Item with the lowest awareness was 'protection of invention patents' with mean of 2.57 points (0.98) followed by 'being an author in a joint research' with 2.64 points (0.94) and sharing of research data with 2.69 points (0.99) <Table 2>.

Table 2: Number of Recognition on Research Ethics (n=102)

Item	Mean±SD
Protection of research subjects and guarantee of confidentiality	3.71±1.15
Misconduct in research (plagiarism/redundancy/manipulation of data)	3.23±1.06
copyright of the research	3.22±1.17
Correct method of quoting documents	2.95±1.02
Management research records	2.80±1.14
Preservation of research data	2.79±1.16
Standards for good researches	2.78±1.07
Ownership of research data	2.76±1.09
Document preparation and process for IRB	2.74±1.36
Sharing of research data	2.69±0.99
Being an author in a joint research/role of a researcher	2.64±0.94
Protection of invention patents	2.57±0.98
Overall mean	2.91±0.89

SD: Standard deviation

5-point scale ('knows very well'=5 points, 'moderate'=3 points, 'not know at all'=1 point)

**b. Level of Self-efficacy Related to Ethical Researches**

Subjects' level of self-efficacy to conduct ethical research was overall mean of 3.15 points (SD=0.73), which is moderate. In detailed items, 'communication ability' was the highest with mean of 3.33 points (0.80) while 'ability to control stress' was the lowest with mean of 2.99 points (0.88) <Table 3>.

Table 3: Level of Self-efficacy for Ethical Performance of Research (n=102)

Item	Mean±SD
Communication ability	3.33±0.80
Critical thinking and problem-solving ability	3.32±0.86
Ethical decision-making ability	3.25±0.90
Conflict-resolving ability	3.07±0.82
Mediation and coordination ability	3.05 ±0.86
Human resources management ability	3.00±0.89
Stress management ability	2.99±0.88
Overall mean	3.15±0.73

SD: Standard deviation

5-point scale ('very strong'=5 points, 'moderate'=3 points, 'none'=1 point)

**c. Level of Knowledge of Research Ethics**

Subjects' knowledge on research ethics recorded mean score of 10.59 points (SD=1.90) out of complete score of 16 or 66.1 points out of 100, which is very low. In detail, level of knowledge on specific practical standards of being an author and methods to write a thesis to avoid plagiarism was low <Table 4>.

Table 4: Level of Knowledge of Research Ethics (n=102)

Item	Number of people with right answer(n)	Rate of correct answer (%)
Definition of plagiarism	100	98
Voluntary consent is absolutely necessary in all researches on human subjects	99	97.1
In case of quoting table or figure from other theses, prior permission should acquired and explanation be provided for quotation	98	96.1
Definition of falsification	97	95.1
3 ethical principles of Belmont Report	95	93.1
Definition of forgery (fabrication)	88	86.3
Whether striking data can be excluded before statistical treatment of data	76	74.5
Data preservation period after completion of research	70	68.6
Self-plagiarism as research misconduct	67	65.7
Possibility to submit as an assignment for another course a report submitted by the researcher	66	64.7
Publishing of a thesis in overseas academic journal which was already published in a domestic academic journal by translating the thesis	56	54.9
Republishing a thesis already published by correcting contents	53	52.0
Announcing research data by adding new data	53	52.0
Decision on main author	49	48.0
Granting author qualification and decision of order	39	38.2
Marking common-sense sentence or contents	23	22.5
Overall mean (Mean±SD, full score of 16)	10.59±1.90 points	

SD: Standard deviation

### C. Difference in Awareness of Research Ethics, self-Efficacy and Knowledge based on Subjects' Characteristics

The results of analysis on the differences among variables based on general characteristics are presented in <Table 5>. Students in general graduate courses, working in educational or research organizations, with experience of having taken ethics courses and experience of having published theses had statistically significantly high level of awareness of research ethics, self-efficacy and knowledge ( $p < 0.05$ ). In addition, students in doctoral courses than master's, over 3rd semesters of doctoral courses and with experience of researches had statistically significantly high level of awareness and knowledge ( $p < 0.05$ ). Although there was no statistical difference based on the kind of research experience, students with experience of having led a research tended to generally have high level of awareness of research ethics, self-efficacy and knowledge.

Table 5: Comparison of Health-related Students' Biomedical Ethical Values according to Bio- medical Ethics Related Characteristics between Two Groups

Item	Classification	n	%	Awareness		Self-efficacy		Knowledge	
				Mean±SD	t(p)	Mean±SD	t(p)	Mean±SD	t(p)
Educational course	General graduate school	46	45.1	3.44±0.78	6.575	3.40±0.54	3.434	11.57±1.59	5.300
	Nursing graduate school	56	54.9	2.47±0.72	(<0.001)***	2.94±0.80	(0.001)**	9.79±1.77	(<0.001)***
Level of degree	Master's	79	77.5	2.68±0.84	5.240	3.08±0.77	1.806	10.13±1.81	5.074
	Doctoral	23	22.5	3.67±0.59	(<0.001)***	3.39±0.53	(0.074)	12.17±1.23	(<0.001)***
Semester	2nd semester of master's and lower	46	45.0	2.61±0.88	0.926 (0.358)	2.93±0.65	2.054 (0.043)*	9.87±1.53	1.421 (0.161)
	Over 3rd semester of master's	33	32.4	2.79±0.78		3.28±0.88		10.48±2.12	
	2nd semester of doctorate and lower	12	11.8	3.38±0.60	2.764 (0.012)*	3.27±0.60	1.054 (0.304)	11.55±1.13	2.646 (0.015)*
	Over 3rd semester of doctorate	11	10.8	3.98±0.40		3.51±0.43		12.75±1.06	
Workplace	Medical institutions	66	64.7	2.56±0.79	6.297	3.02±0.76	2.461	9.94±1.75	5.247
	Univ./Research/others	36	35.3	3.54±0.68	(<0.001)***	3.38±0.62	(0.016)*	11.78±1.57	(<0.001)***
Research experience	Yes	43	42.2	2.32±0.69	6.934	2.99±0.79	1.859	9.67±1.55	4.529
	No	59	57.8	3.34±0.76	(<0.001)***	3.26±0.67	(0.066)	11.25±1.86	(<0.001)***
Kind of research experience	Joint research/assistance	32	54.2	3.19±0.85	1.723 (0.090)	3.24±0.77	0.269 (0.789)	10.88±1.98	1.777 (0.081)
	Lead (main) researcher	27	45.8	3.53±0.60		3.29±0.53		11.73±1.61	
Experience of having taken ethics courses	Yes	76	74.5	2.74±0.90	3.412 (0.001)**	3.05±0.77	2.194 (0.031)*	10.28±1.82	2.940 (0.004)**
	No	26	25.5	3.39±0.67		3.41±0.52		11.50±1.88	
Experience of having published theses	Yes	77	75.5	2.62±0.79	8.546	3.06±0.78	2.559	10.13±1.80	4.701
	No	25	24.5	3.79±0.51	(<0.001)***	3.40±0.49	(0.013)*	12.00±1.47	(<0.001)***

SD: Standard deviation

Awareness: 5-point scale ('knows very well'=5 points, 'moderate'=3 points, 'not know at all'=1 point)

Self-efficacy: 5-point scale ('very strong'=5 points, 'moderate'=3 points, 'none'=1 point)

Knowledge: full mark of 16

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**D. Relationship among the Level of Awareness of Research Ethics, Self-efficacy and Knowledge**

Results of analysis on the relationship among the level of awareness of research ethics, self-efficacy and knowledge are presented in <Table 6>. There were significantly positive relationships between awareness of research ethics and level of self-efficacy ( $r=0.403$ ,  $p<0.001$ ) and level of knowledge ( $r=0.509$ ,  $p<0.001$ ) and between self-efficacy and the level of knowledge ( $r=0.280$ ,  $p=0.004$ ).

Table 6: Relationship among Level of Awareness, Self-efficacy and Knowledge of Research Ethics (n=102)

Item	Awareness	Self-efficacy	Knowledge
Awareness	1		
Self-efficacy	0.403***	1	
Knowledge	0.509***	0.280**	1

\* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

**IV. EXPLORATION**

So far, education on research ethics has tended to be conducted in informal and customary ways and thus, there have been many cases in which researchers violate research ethics due to lack of knowledge as well as cases where they commit violation intentionally.<sup>4</sup> In particular, sufficient understanding and prior knowledge is critical considering the characteristics of public health science which focuses its researches on human life and health. In addition, as graduate courses are not a simple continuation of undergraduate courses but they focus on raising researchers in academic and clinical settings, it is essential to perform systematic education on research ethics for graduate students who just start their research careers.<sup>5</sup> Therefore, the purpose of this study was to investigate public health graduate students' level of awareness, self-efficacy and knowledge of research ethics and to provide basic material for the development of educational programs on.

Recently, with the increasing social awareness on the observance of research ethics and emphasis on education of research ethics all across academic fields, educations on research ethics are being provided in various forms including complementary educations and workshops by academic societies as well as formal courses.<sup>6</sup> Although there is no definite consensus on the domains and scope of research ethics, Office of Research Integrity of the U.S. and Ministry of Science, ICT and Future Planning in Korea emphasize that researches shall be conducted based on the standards of integrity, exactness, efficiency and objectivity.<sup>7</sup> Even with these guidelines and principles being presented for the observance of research ethics, misconducts in researches and violation of basic principles of research ethics are being continuously reported today. This reflects the fact that research ethics has not taken firm root in the minds of researchers in Korea yet.

From 2006, fact-finding survey on activities of research ethics has been conducted by domestic universities and government-subsidized researches every 2 years, which demonstrates that academic systems have gradually improved over the years.<sup>8</sup> According to report on 'Survey and analysis on activities of research activities in Korea' conducted in 2006, educations were performed in 8 universities (3.7%) among a total of 217 universities and in 21 (7.5%) among 280 academic societies while, in 2008, 59 universities (43.4%) among a total of 136 universities, 135 (21.9%) among 616 academic societies and 25 (86.2%) among 28 government-funded research institutions performed education and, in 2010, 56.5% of universities, 33.2% of academic societies and 70.0% of government-funded research institutions performed education to establish awareness on research ethics.

Consistent violations of research ethics in spite of these improvements of systems imply that educational institutions do not sufficiently reflect demands of the field. Even universities practicing ethics education mainly focus on bioethics and systematic education on research ethics are not yet fully implemented. This situation suggests that, in order to improve awareness on research ethics, it is necessary to provide formal educations for practical research ethics which are specialized for each academic discipline.

In a study on 267 researchers in the area of bio-science in Korea,<sup>9</sup> 32.2% of them replied that the lack of research ethics in Korea is caused by the lack of standards for performance and awareness and 31.1% indicated lack of education while 96.6% responded that education on research ethics is necessary. This result implies that although researchers' awareness on the necessity of education on research ethics, there is still practical lack of opportunities to attend systematic formal education on research ethics. 74.5% of the subjects of this study had no experience of having taken courses on research ethics and the level of awareness on

research ethics scored average 2.91 points in 5-point scale, exhibiting less than moderate. While students' awareness on protection of research subjects and misconduct in research such as plagiarism, forgery and falsification was high, awareness on interests in research ethics such as sharing of research data, role in joint research or protection of invention patents was relatively low. Although interest is an area emphasized in research ethics today, awareness on this area recently introduced looks still incipient.

Considering that awareness on research ethics was significantly high in the subjects of this study who are on research-focused general graduate courses and those with higher degree and experience of having published thesis, in order to raise awareness on research ethics, it is deemed necessary to provide students with opportunities to practically experience researches in addition to educations to deliver knowledge to them. Overseas universities conduct practical case-centered ethics education as part of formal curriculums in undergraduate and graduate courses and most universities and research institutions run independent supervisory organizations such as Research Integrity Committees, providing implications for graduate education field in Korea.

Especially, given that graduate students are beginning to conduct and participate in researches in earnest, it is vital to develop and run educational programs to raise their awareness on research ethics. Although there are preceding study reporting<sup>10</sup> that a limited number of universities and research institutions have developed curriculums on research ethics, most of them are implemented as short-term seminars, workshops or elective courses and most are not tailored to nursing science. Thus, as they have limitations to provide systematic education, improvement needs to be made.

Self-efficacy of researches means having belief or self-confidence that they can successfully perform tasks necessary for responsible researches and it is highly related to a researcher's competency in performing a good researches. In a study on medical graduate school students, self-efficacy whether researchers can take ethical aspects into considerations was 2.33 points out of full mark of 4 points, which is moderate level.<sup>11</sup>

Subjects' self-efficacy on performance of ethical researches in this study was 3.15 points out full mark of 5, displaying similar results to those of preceding studies. In detailed items, subjects' responses that they can do well in stress management, management of human resources and coordination ability were relatively low. Considering that students in higher semester of degree courses and with experience of having taken ethics courses and having published theses have relatively high level of self-efficacy, intervention strategies are deemed to be required to form self-efficacy in early stages by coordinating curriculums so that students can take courses on research ethics and by providing them with opportunities to have research and publishing experiences through vitalization of professor-student researches.

Subjects' level of knowledge of research ethics in this study was 10.5 out of full mark of 16, which is converted to be 66.1 points out of 100, similar to the results of preceding studies. As the result of measuring the level of American graduate students knowledge for performance of responsible researches, the score ranged from the lowest 26.7 points to 83.3 points with mean score of 59.5 and level of knowledge was similar among students whether they belonged to master's course, doctoral course or post doctoral course.<sup>12</sup> In a preceding study on 267 researchers on bio-science in Korea, those who responded that their knowledge is sufficient were as low as 4.9%.<sup>13</sup>

Although subjects of this study were well aware of simple definitions on plagiarism, forgery and falsification, rate of correct answer to the question "common-sense sentences and contents do not require use of quotation marks and not need to credit the author" in the knowledge on quotations was the lowest 22.5%. That is, students relatively lacked practical knowledge on cases of misconduct in researches such as plagiarism, forgery and falsification and on solutions to conflicts of interests such as granting of authorship and joint research. This requires practical educational methods such as discussions with actual cases of misconducts in researches or conflicts of interests or actual writing of quotations rather than education centering on simple delivery of theories.

In addition, detailed contents should also be tailored to public health science by reflecting the demands of public health graduate students. Although Center for Research Ethics Information (CRI) in Korea provides various cases of educational materials on research ethics on its website, there is still lack of specific cases which is specialized in public health science. As graduate students can avoid unintentional misconducts and unethical academic behaviors when they possess clear understanding on research ethics as responsible scientists working on humans, systematic educations for research ethics are required. Educations on research

ethics are mainly implemented in graduate courses but they are mostly performed as a part of courses on public health research methods and bioethics for 2-3 hours a semester rather than as independent formal courses.<sup>14</sup> Thus, there are limitations in raising research ethics and good researchers to perform responsible researches.

Under the current circumstances when education on research ethics is strongly demanded across domestic and overseas academic circles, development of curriculums on research ethics tailored to public health graduate students and introducing them into formal courses of graduate schools may satisfy these educational demands and, additionally, vitalize education and researches related to research ethics through interdisciplinary networks among medical professionals involved in research ethics and ultimately contribute to practicing, distributing and spreading a higher level of research ethics and forming and establishing desirable research culture as researchers live up to public expectations and national goals through firm establishment of research ethics.

## V. CONCLUSION AND SUGGESTIONS

This study analyzed 102 public health graduate students' level of awareness, self-efficacy and knowledge of research ethics and relationship among them. Public health graduate students' level of awareness of research ethics scored less than moderate (2.91 points, full mark of 5 points) and self-efficacy recorded a moderate level (3.15 points, full mark of 5 points) while level of knowledge marked 66.1 points (point calculated based on full mark of 100 points). These scores are lower than expected even with a national approach and investments for desirable research performances. Students who are enrolled in research-centered courses and completed various academic activities such as participation in researches and publication of thesis had higher level of variables related to research ethics. In addition, subjects' awareness ( $r=0.509$ ,  $p<0.001$ ) and self-efficacy ( $r=0.280$ ,  $p<0.004$ ) of research ethics had significantly positive relationship with their level of knowledge.

Based on these results, author of this study suggests ways to vitalize the education of research ethics for public health graduate students as follows;

First, as level of awareness, self-efficacy and knowledge of research ethics vary according to public health graduate students' general characteristics, follow-up studies are required to confirm various levels of public health researchers' competency for research ethics.

Second, it is necessary to develop and apply tailored education programs of research ethics centering on practical cases which can enhance the level of public health graduate students' awareness, self-efficacy and knowledge of research ethics.

Third, more active educational activities on research ethics are required by opening formal courses on research ethics in graduate curriculums.

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## Student-faculty Trust and Major Satisfaction in Pre-licensure Baccalaureate Nurse Education

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### Abstract---

**Objectives:** Major satisfaction is a critical issue for selecting a job in the future. This study investigated the relationship between student-faculty trust and major satisfaction in Korean pre-licensure baccalaureate nursing students.

**Methods/Statistical analysis:** A cross-sectional study was conducted using a structured questionnaire survey with 165 nursing students at C University. A questionnaire was constructed to assess student-faculty trust and major satisfaction in nursing. The statistical methods used for analyzing data were descriptive statistics, t-test, ANOVA with scheffé test, Pearson's correlation, and multiple regression using IBM SPSS Statistics 19.

**Findings:** Most participants were female (n=154, 93.3%) with mean age 21.25 years old. The mean scores for student-faculty trust and major satisfaction were 4.01 and 3.94, respectively. Significant differences were noted with student-faculty trust by academic year and relationship with friends. Major satisfaction showed a statistically significant difference by reasons for selecting nursing school and relationship with friends. Student-faculty trust was positively correlated with major satisfaction. In the regression model, intimacy and teaching which are the sub-dimensions of student-faculty trust predicted major satisfaction ( $F=33.81, p<.001$ ) and explained 44.5% of the variance of major satisfaction.

**Improvements/Applications:** With these results, student-faculty trust is expected to be an important factor for major satisfaction in students. Therefore, a program for enhancing student-faculty trust grounded on intimacy should be developed.

**Keywords---** Faculty, Nursing, Satisfaction, Student, Trust.

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## I. INTRODUCTION

Universities are competing to recruit and retain students due to decreasing school age population and diversifying school selection<sup>1</sup>. In the case of nursing science major, the admission of nursing science has increased by 4,453 people nationally<sup>2</sup>, which makes expansion within the department. This situation is liable to overlook the diverse needs of students and fail to meet students' major satisfaction. Since major satisfaction is an important factor for having career attitude maturity<sup>3</sup> and for predicting college adjustment<sup>4</sup>. Research by Park and Oh<sup>5</sup> examined the major satisfaction among Korean nursing students and concluded that major satisfaction seems to be an important facilitator of successful professional healthcare provider.

Studies about factors that relate to student satisfaction with university life have received attention, but much more needs to be known about the student-teacher relationship and its role to the student success<sup>6</sup>. Student-faculty trust-related research within academic self-efficacy has been conducted through the examination of these relationships in nursing students<sup>7</sup>. Studies of student-faculty trust include topics such as learning outcomes<sup>8</sup>, academic persistence<sup>9</sup>, and college adjustment<sup>10</sup>. Most student-faculty trust has been studied in the field of general education, but there is a lack of research for nursing students. Therefore, this study investigated the relationship between student-faculty trust and major satisfaction in pre-licensure baccalaureate nursing students.

## II. METHOD

### A. Design

This is a cross-sectional descriptive study designed to investigate the major satisfaction in pre-licensure baccalaureate nursing students. A correlational design was used to examine the relationship between student-faculty trust and major satisfaction with a convenience sample.

### B. Participants and Data Collection

Based on G\*Power 3.1.9.2 program, 129 subjects were needed to consider a medium effect (.15) with an alpha less than .05, power of .95, and 9 predictors. In June 2016, 165 nursing students in junior and senior were recruited from a BSN nursing education program of C University in a D city in South Korea. All students that participated signed informed consent. Participants were informed that all responses would be kept confidential and anonymous.

### C. Measurements

The operational definition of study concepts in this study are described as follows.

*Student-faculty trust* was measured by 27-item scale developed by Jeong and Park<sup>11</sup>. The scale is developed to measure professor trust composed of four types: intimacy, expertise, teaching and leadership. A five-point Likert scale was used with one (1) not at all and five (5) very much so to describe the trust of faculty perceived by the respondents. Higher scores indicate higher level of student-faculty trust. An overall Cronbach alpha coefficient of original study was .96 and four types of Cronbach alpha coefficient were .85, .83, .84, and .80 respectively. In this study, overall Cronbach alpha coefficient of .92 was calculated and four types of Cronbach alpha coefficient of .86, .93, .89, and .92 were calculated respectively.

*Major satisfaction* was measured by a tool developed by Kim and Ha<sup>12</sup> and modified by Song<sup>13</sup>. This is a 22-item instrument that utilized to measure the sub-dimensions of : curricular, relationship, general, perception, and career aspect. Each item was rated on a five-point Likert scale ranging from one (1) strongly disagree to five (5) strongly agree. Higher scores indicate higher level of major satisfaction. An overall Cronbach alpha coefficient of reliability in original study was .95 and sub-dimensions' alpha were of .80, .79, .90, .87 and .80 respectively. In this study, overall Cronbach alpha coefficient of .95 was calculated and five sub-dimensions of Cronbach alpha coefficient of .82, .88, .92, .88 and .89 were calculated respectively.

Demographic data of age, gender, academic year, reasons for selecting nursing school and peer-relationship were obtained from pre-licensure baccalaureate nursing students.

### D. Data Analysis

The statistical methods program used were IBM SPSS Statistics 19. Data cleaning and screening were done before data were analyzed. Statistical significance was defined as  $p < .05$ . Descriptive statistics were used to identify the general demographic characteristics of the subjects and the measurement. Demographic factors

by student-faculty trust and major satisfaction were analyzed by using t-test and ANOVA with post hoc analysis (Scheffe's multiple range test). Pearson's correlation coefficient was used to examine the relationship between student-faculty trust and major satisfaction. Multiple regression was conducted to predict the variables of student-faculty trust.

### III. RESULTS

#### A. General Characteristics

Table 1 presents the general demographic characteristics of the study subjects. The average age of participants was 21.25 years and majority were female (n=154, 93.3%). Junior were 51.5%(n=85). Most of the reasons for selecting nursing school was to get a job easily (n=65, 39.4%). Of the respondents, 58.2% (n=96) had good relationship with friends.

Table 1: General Characteristics and Differences in Variables according to General Characteristics (N=165)

Variables	Categories	n(%) or M±SD	SFT	t/F(p)	MS	t/F(p)
			M±SD		M±SD	
Age(year)		21.25±1.41				
Gender	Male	11(6.7)	4.16±0.28	1.16	3.79±0.41	-1.08
	Female	154(93.3)	4.00±0.46	(.247)	3.95±0.49	(.282)
Academic year	Junior	85(51.5)	4.14±0.40	4.11	3.98±0.49	1.18
	Senior	80(48.5)	3.87±0.47	(<.001)	3.89±0.47	(.239)
Reasons for Selecting nursing	Getting a job <sup>a</sup>	65(39.4)	3.97±0.43	1.38	3.89±0.39	6.36
	Aptitude <sup>b</sup>	34(20.6)	4.17±0.43	(.236)	4.28±0.43	(<.001)
	Economic safety <sup>c</sup>	7(4.2)	3.90±0.55		3.66±0.50	(b>a,d,f>c,e)
	Professionalism <sup>d</sup>	20(12.1)	3.97±0.38		3.95±0.48	
	Grade <sup>e</sup>	10(6.1)	3.84±0.52		3.56±0.53	
	Recommendation <sup>f</sup>	29(17.6)	4.00±0.52		3.86±0.51	
Peer-relationship	Good <sup>a</sup>	96(58.2)	4.09±0.42	5.47	4.03±0.46	5.85
	Moderate <sup>b</sup>	61(37.0)	3.93±0.44	(.005)	3.85±0.49	(.004)
	Bad <sup>c</sup>	8(4.9)	3.64±0.69	(a>c)	3.56±0.45	(a>c)

Note. SFT = Student-faculty trust

#### B. Degree of Student-faculty Trust and Major Satisfaction

Table 2 provides the item mean scores of the respondents on each of the measurement used as well as the possible range of scores for each measurement. The item mean score of student-faculty trust was 4.01(range 2.85-4.93). The item mean scores of intimacy, expertise, teaching, and leadership were 3.52, 4.36, 4.33, and 3.93, respectively (range=2.25-4.75, 3.00-5.00, 2.20-5.00, and 2.17-5.00). And the item mean score of major satisfaction was 3.94(range2.77-5.00). The item mean scores of curricular, relationship, general perception, and career aspect were 3.91, 3.63, 3.81, 4.23, and 3.92, respectively (range =2.20-5.00, 2.00-5.00, 2.00-5.00, 2.83-5.00, and2.33-5.00).

Table 2: Degree of Student-faculty Trust and Major Satisfaction (N=165)

Variables	Sub-dimensions	M/Item±SD	Range
Student-faculty	Total	4.01±0.45	2.85-4.93
Trust	Intimacy	3.52±0.53	2.25-4.75
	Expertise	4.36±0.53	3.00-5.00
	Teaching	4.33±0.58	2.20-5.00
	Leadership	3.93±0.67	2.17-5.00
Major	Total	3.94±0.48	2.77-5.00
Satisfaction	Curricular	3.91±0.55	2.20-5.00
	Relationship	3.63±0.63	2.00-5.00
	General	3.81±0.61	2.00-5.00
	Perception	4.23±0.62	2.83-5.00
	Career aspect	3.92±0.67	2.33-5.00

#### C. Differences in Variables according to General Characteristics

Student-faculty trust differed significantly according to academic year and relationship with friends. Junior showed statistically significant higher trust to the professor(t=4.11, p<.001).Participants who had good

relationship with friends reported statistically significant higher student-faculty trust than those who had bad relationship with peers ( $F=5.47, p=.005$ ).

Major satisfaction showed a statistically significant difference by reasons for selecting nursing school and relationship with friends. Participants who selected a nursing school because of having their aptitude showed the highest statistically significant nursing major satisfaction ( $F=6.36, p<.001$ ). Participants who had good relationship with friends also reported statistically significant higher nursing major satisfaction than those who had bad relationship with their friends ( $F=5.85, p=.004$ ) (Table 1).

**D. Correlations among Variables**

Table3 presents correlations coefficients among the measurement variables. There were highly statistically significant positive correlations between student-faculty trust and major satisfaction. There were highly significant correlations between curricular satisfaction and intimacy ( $r=.41, p<.001$ ), expertise ( $r=.51, p<.001$ ), teaching ( $r=.52, p<.001$ ), and leadership ( $r=.51, p<.001$ ). Relationship in major satisfaction was positively correlated with intimacy ( $r=.59, p<.001$ ), expertise ( $r=.44, p<.001$ ), teaching ( $r=.37, p<.001$ ), and leadership ( $r=.65, p<.001$ ). General major satisfaction was also positively correlated with intimacy ( $r=.49, p<.001$ ), expertise ( $r=.40, p<.001$ ), teaching ( $r=.46, p<.001$ ), and leadership ( $r=.50, p<.001$ ). There were also positively significant correlations between perception of major satisfaction and intimacy ( $r=.35, p<.001$ ), expertise ( $r=.34, p<.001$ ), teaching ( $r=.36, p<.001$ ), and leadership ( $r=.30, p<.001$ ). Lastly, major satisfaction in career aspect was highly significant correlated with intimacy ( $r=.37, p<.001$ ), expertise ( $r=.33, p<.001$ ), teaching ( $r=.37, p<.001$ ), and leadership ( $r=.29, p<.001$ ).

Table 3: Correlations between Student-faculty Trust and Major Satisfaction (N=165)

Variables	Student-faculty trust					Major satisfaction			
	Intimacy	Expertise	Teaching	Leadership	Curricular	Relationship	General	Perception	Career aspect
	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)
Intimacy	1								
Expertise	.37***	1							
Teaching	.36***	.67***	1						
Leadership	.59***	.54***	.53***	1					
Curricular	.41***	.51***	.52***	.51***	1				
Relationship	.59***	.44***	.37***	.65***	.54***	1			
General	.49***	.40***	.46***	.50***	.72***	.48***	1		
Perception	.35***	.34***	.36***	.30***	.41***	.41***	.53***	1	
Career aspect	.37***	.33***	.37***	.29***	.43***	.39***	.54***	.65***	1

\* $p<.05$ , \*\* $p<.01$ , \*\*\* $p<.001$

**E. Predictive Factors for Major Satisfaction**

Table 4 reports the findings of the multiple regression analysis, which was used to predict the variance of the major satisfaction. Adjusted multiple R for regression was statistically significant with 44.5% of the variance ( $F=33.81, p<.001$ ). Among the variables of student-faculty trust, intimacy( $\beta=.31, p<.001$ )and teaching ( $\beta=.24, p=.004$ )showed statistically significant regression coefficients.

Table 4: Results of Multiple Regression Analysis for Major Satisfaction (N=165)

Outcome variable	Variables	B	SE	$\beta$	t	p	Collinearity statistics			
							Tolerance	VIF	Adj.R <sup>2</sup>	F(p)
Major satisfaction	Constant	23.40	5.80		4.03	<.001			.44	33.81
	Intimacy	6.17	1.45	.31	4.25	<.001	0.65	1.55		(<.001)
	Expertise	2.89	1.63	.15	1.77	.078	0.51	1.98		
	Teaching	4.34	1.49	.24	2.92	.004	0.51	1.95		
	Leadership	2.59	1.29	.16	2.01	.046	0.51	1.98		

As can be seen in Table 5, the multiple regression analysis was conducted with the sub-dimensions of major satisfaction as the dependent variable and intimacy, expertise, teaching, and leadership as independent variables. Model 1 including intimacy, expertise, teaching, and leadership accounted for 36.2% of the variance in the curricular satisfaction of the major ( $F=24.24, p<.001$ ). In the curricular satisfaction of the major, expertise ( $\beta=.19, p=.029$ ), teaching ( $\beta=.24, p=.007$ ), and leadership ( $\beta=.20, p=.026$ ) showed statistically significant regression coefficients. In Model 2, relationship in major satisfaction as an outcome variable resulted in a significant adjusted R<sup>2</sup> as much as 48.7% of the variance ( $F=39.94, p<.001$ ). Among the subtypes of student-faculty trust, leadership ( $\beta=.42, p<.001$ ) had the most positive effect on relationship in major

satisfaction. In Model 3 with general major satisfaction as an outcome variable, intimacy ( $\beta=.32, p<.001$ ), teaching ( $\beta=.24, p=.007$ ), and leadership ( $\beta=.18, p=.041$ ) explained 33.6% of the variance ( $F=21.73, p<.001$ ). Model 4 accounted for 17.1% of the variance in the perception of major satisfaction ( $F=9.47, p<.001$ ). Intimacy ( $\beta=.24, p=.008$ ) and teaching ( $\beta=.20, p=.042$ ) showed statistically significant regression coefficients in the perception of major satisfaction. In Model 5 career aspect of the major satisfaction resulted in 18.4% of the variance ( $F=10.24, p<.001$ ). Statistically significant regression coefficients are similar with that of model 4, which are intimacy ( $\beta=.28, p=.002$ ) and teaching ( $\beta=.23, p=.023$ ).

Table 5: Results of Multiple Regression Analysis for Sub-dimensions of Major Satisfaction(N=165)

Outcome variable	Variables	B	SE	$\beta$	t	p	Collinearity statistics				
							Tolerance	VIF	Adj.R <sup>2</sup>	F(p)	
Curricular (Model1)	Constant	0.91	0.33		2.81	.006			0.00	.36	24.24
	Intimacy	0.14	0.08	.14	1.77	.078	0.65		1.55		(<.001)
	Expertise	0.20	0.09	.19	2.20	.029	0.51		1.98		
	Teaching	0.23	0.08	.24	2.72	.007	0.51		1.95		
	Leadership	0.16	0.07	.20	2.24	.026	0.51		1.98		
Relationship (Model2)	Constant	0.34	0.33		1.01	.312				.49	39.94
	Intimacy	0.37	0.08	.31	4.49	<.001	0.65		1.55		(<.001)
	Expertise	0.16	0.09	.13	1.67	.096	0.51		1.98		
	Teaching	-0.06	0.08	-.05	-0.66	.507	0.51		1.95		
	Leadership	0.40	0.07	.42	5.39	<.001	0.51		1.98		
General (Model3)	Constant	0.75	0.37		2.04	.043				.34	21.73
	Intimacy	0.32	0.09	.28	3.48	.001	0.65		1.55		(<.001)
	Expertise	0.04	0.10	.04	0.41	.682	0.51		1.98		
	Teaching	0.26	0.09	.24	2.73	.007	0.51		1.95		
	Leadership	0.17	0.08	.18	2.06	.041	0.51		1.98		
Perception (Model4)	Constant	1.76	0.41		4.25	<.001				.17	9.47
	Intimacy	0.28	0.10	.24	2.67	.008	0.65		1.55		(<.001)
	Expertise	0.14	0.12	.12	1.20	.234	0.51		1.98		
	Teaching	0.22	0.11	.20	2.05	.042	0.51		1.95		
	Leadership	-0.01	0.09	-.01	-0.14	.887	0.51		1.98		
Career Aspect (Model5)	Constant	1.18	0.45		2.64	.009				.18	10.24
	Intimacy	0.36	0.11	.28	3.21	.002	0.65		1.55		(<.001)
	Expertise	0.12	0.13	.10	0.99	.322	0.51		1.98		
	Teaching	0.26	0.11	.23	2.30	.023	0.51		1.95		
	Leadership	-0.05	0.10	-.05	-0.54	.592	0.51		1.98		

#### IV. DISCUSSION

This paper tried to investigate the relationship between student-faculty trust and major satisfaction and to examine the effect of student-faculty trust on major satisfaction in Korean pre-licensure baccalaureate nursing students. The item mean score of major satisfaction in this study was 3.94 with possible range 1-5. This mean major satisfaction score of the nursing students was higher than that of the studies of major satisfaction in social welfare<sup>14</sup> and dental hygiene<sup>15</sup> major students. The comparatively high mean major satisfaction reported in the current study can be because the participants were limited to junior and senior. More research is needed to explore the subjects.

The sub-dimensions of both student-faculty trust and major satisfaction were highly and significantly positively correlated with each variable. Therefore, there should be a way to improve student-faculty trust in order to improve major satisfaction for nursing students. With major satisfaction as outcome variable, the model accounted for 44.5% of the variance in the outcome variables. In this model, intimacy and teaching accounted for significant portion of variance in major satisfaction. Intimacy emerged as the strongest predictor of major satisfaction and most sub-dimensions. This is line with the findings reported by Ryu<sup>16</sup>, although his research measured the academic and social adjust in college as outcome variable.

The study showed that the more student-faculty trust students had, the higher major satisfaction they showed. This result supports previous research indicating that professor trust is positively related with

academic self-efficacy which is the predictor of major satisfaction<sup>7</sup>. This study suggests that, based on the findings, the extension of trusting interpersonal relationships between students and professors would contribute to have deeper understandings of students for professors and higher nursing major satisfaction.

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## Schema of Korean Nursing Students toward People with Disabled

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### Abstract---

**Background/Objectives:** This study is a causal research conducted to identify the factors that affect the schema for disabled of nursing college students.

**Methods/Statistical analysis:** The statistical analysis results of the questionnaire that was conducted on a total of 114 college students in a city. The data collected for this study was analyzed by means of SPSS 19.0.

**Findings:** The summarized results were as follows. (1) Schema for disabled is negative. (2) Schema had a negative correlation with satisfaction of major ( $r=-.264$ ,  $p=.005$ ), the number of participations in voluntary work for the disabled ( $r=-.226$ ,  $p=.016$ ). (3) The factor that had the negative impact on schema was satisfaction with the major ( $\beta=-0.223$ ), the number of participations in voluntary work for the disabled ( $\beta=-0.188$ ) with the R squared of the model being 8.8 ( $F=6.433$ ,  $p=.002$ ).

**Improvements/Applications:** Based on this study, the strategies that can increase satisfaction with the major and activity disabled related service is suggested to decrease negative schema for disabled among nursing college students

**Keywords---** Schema, Disabled, Nursing College Students, Satisfaction with the Major, the Number of Participations in Voluntary Work for the Disabled.

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## I. INTRODUCTION

The schema theory is a concept that was first introduced in psychology. It implies that as people's prior knowledge and experience are stored in a form of structuralized knowledge called 'schema,' they continue affecting various processes such as recognition, searching, memory, inference, and decision in connection with other information<sup>1</sup>. The schema theory is utilized in the field of education as a theoretical frame for researches that seek changes in students' schemata. This theory is quite useful as it explains various factors that may affect the development of effective approaches to education and learning and the results can be utilized in the process of education<sup>2,3</sup>.

Humans recognize and remember certain objects through a cognitive process and interpret and judge related events<sup>3</sup>. In this process, information is transformed and restructured through the individual's schema, being stored in his or her brain. As this cognitive process proceeds, images of an object are formed and changed in connection with related information, which may be explained on the basis of the schema theory<sup>4</sup>. Once a schema on a certain object is formed in a person, other information being infused and processed is judged and stored subjectively based on the schema<sup>2</sup>. Thus, a schema that has already been formed affects a person's cognitive processes and the formation of a positive or negative view on new information based on his or her judgment.

It is thought that an approach to negative perspectives on the disabled over the general domestic society can be adopted on the basis of the schema theory. In other words, there needs to be a systematic approach to specific images of the disabled in the cognitive view of the schema theory as well as variables and learning courses that affect the cognitive process of recognizing, remembering, interpreting, and judging the disabled<sup>4</sup>.

According to the schema theory, a person's recognition of the disabled is changed and restructured as it passes through the schema about the disabled that has been formed for a long period of time rather than the process of mere storage and judgment of information on the disabled. It may be assumed that distorted subjectivity may be involved and remain. However, a schema is an active process of knowledge: An existing schema is evaluated based on new information, and if a discordance between them is found, the schema is removed or a new schema is structured<sup>1,3</sup>. Thus, a negative perspective on an object may be changed into a positive perspective as new information is infused and a strategic approach is adopted. Since a schema is formed by experience in interaction with sociocultural backgrounds, the formation process of a schema needs to be examined in order to change a person's schema. This means that it is possible to induce the formation of a positive schema by finding out factors related to the problematic schema, providing new information on such variables, and thus restructuring and changing the negative schema.

When forming a therapeutic relationship with a patient, nurses need to maintain an objective stand with no prejudice or bias against others in recognition of their convictions and values. To this end, regular curriculums of nursing education provide consistent education programs for nurses to develop their dispositions and capabilities that help forming a therapeutic relationship. Educational intervention is one specific approach as part of this education that aims to check and minimize the extent of nurses' prejudice and bias against the disabled. Such intervention can be an important strategy in establishing an objective stand, which is required to form a therapeutic relationship with the disabled.

Most researches conducted among nursing students on their attitudes and fixed ideas about the disabled are a quantitative study on the relation between major factors and variables or a qualitative study on how to address prejudices. More efforts are put forth than before into finding a basis for strategies to prevent fixed ideas and prejudices rather than into verifying related factors<sup>5-8</sup>. Such changes reflect the need for practical explorative researches on specific plans, not merely for examination, but for improvement of recognition.

Accordingly, this study aims to examine schemata about the disabled among nursing students on the basis of the schema theory, to verify variables in forming a positive schema about the disabled and their influence, and to provide a basis for capacity development education that is required for the formation of a therapeutic relationship.

## II. METHODOLOGY

### A. Research Design

This study is a descriptive survey research to examine schemata about the disabled among nursing students and to verify the relation between schemata and major variables.

## **B. Subjects and Data Collection**

The number of samples required in this study is 107 individuals as confirmed by means of G-power 3.1 in consideration of the fact that the number of predictors in the multiple regression analysis was 2, the significance level .05, the medium effect size .15, and the testing power 95% respectively. A survey on schemata about the disabled was conducted by means of the questionnaire among randomly selected 120 individuals who were nursing students at a college located in D city.

## **C. Statistical Method**

The data collected for this study was analyzed by means of SPSS 19.0.

1. Subjects' general characteristics and schemata were analyzed based on the actual number and percentage, average, and standard deviation.
2. For the tool's reliability, Cronbach's alpha values were referred to.
3. For the difference in schemata depending on subjects' characteristics, t-test was used.
4. For the correlation between subjects' characteristics and schemata, Pearson correlation coefficient was utilized.
5. For the influence of subjects' characteristics on schemata, the hierarchical multiple regression analysis was conducted.

## **D. Survey Tools**

### ***Schema about the Disabled***

To analyze schemata about the disabled, the semantic differential scale was used. It was utilized based on the semantic analysis scale of Osgood<sup>9</sup>. And Dong-hwanJang analyzed 50 adjectives that Koreans use as factors, and divided them into evaluation factors, activity factors, potency factors, and speculative factors<sup>10</sup>. Adjectives used in this study include those of evaluation factors, potency factors, and mental-speculative factors. After the preliminary step, 9 pairs of adjectives were selected in the final stage for schema analysis. The selected adjectives were given points in the semantic differential scale of 10 points, 1 to 10, from left to right. The higher point, the more negative schema about the disabled is. As for the reliability of the schema analysis tool, the value of Cronbach's alpha was .75.

### ***Satisfaction with the Major***

5-point Likert Scale was used to assess the level of satisfaction with the major: 'very unsatisfactory' is given 1 point, 'unsatisfactory' 2, 'normal' 3, 'satisfactory' 4, and 'very satisfactory' 5 respectively.

### ***Number of Participations in Voluntary Work for the Disabled***

Subjects were asked to state the number of participations in voluntary work for the disabled. The larger number, the more participations in voluntary work is.

### ***Health Condition and Relationship with Friends***

5-point Likert Scale was used to assess the level of health condition and relationship with friends: 'Very good' was given 1 point, 'good' 2 points, 'normal' 3 points, 'not good' 4 points, and 'very bad' 5 points respectively. The higher score, the lower level is.

## **E. Methods and Procedures of Data Collection**

Data collection was conducted among nursing students at a college located in D city, Korea, in October 2013. After the objective and methods of the study were explained to the students, the questionnaires were distributed to those who agreed with participating in the survey. Before the survey began, the objective of study, data-processing methods, anonymity of subjects, and harmlessness to subjects were explained to the students, and questionnaires were distributed only to those who were willing to participate. Subjects were also notified that they could withdraw from the research anytime if they did not want to participate during the survey, and data collection started after subjects' agreement with the above-mentioned aspects were collected. 118 copies of the questionnaire were collected, and except 4 with insufficient responses, 114 copies were used in the final analysis.

### III. RESULT OF STUDY

#### A. General Characteristics of Subjects

As shown in table 1, among 114 participants in total, female subjects were more than male subjects. Those aged from 20 to 29 accounted for the largest portion, and the average age was 24. 68 individuals (59.6%) stated that their relationships with friends were 'good;' 60 (52.6%) stated that their health condition was 'good; and 52 (45.6%) stated that the major was 'satisfactory' to them. 93 (81.6%) stated that there were 'no' disabled family members, and 81 (71.1%) stated that they had 'no' experience of contacting with disabled ones in life, which indicates that most students had no disabled family members or no experience of contacting with disabled ones. As for the number of participations in voluntary work for the disabled, 105 individuals (92%) stated 'less than 10 times,' and 9 (8%) stated '10 or more times.' 52 individuals (45.6%) stated that they 'had' experience of taking an education course regarding the disabled, and 62 (54.4%) stated 'no'. As for economic conditions, the number of those whose monthly income exceeded 3 million won was 57(50%) which accounted for the largest portion

Table 1

Characteristic	Category	N(%)	M±SD
Gender	Female	100(87.7)	
	Male	14(12.3)	
Age(year)	20-29	103(90.4)	24.19±4.72
	≥30	11(9.6)	
Healthcondition	Very good	22(19.3)	2.15±80
	Good	60(52.6)	
	Normal	25(21.9)	
	Bad	7(6.1)	
	Very bad	0(0)	
Relationships with friends	Very good	23(20.2)	2.00±.63
	Good	68(59.6)	
	Normal	23(20.2)	
	Bad	0(0)	
	Very bad	0(0)	
Satisfaction with the major	Very unsatisfactory	2(1.8)	3.63±.77
	Unsatisfactory	2(1.8)	
	Normal	45(39.5)	
	Satisfactory	52(45.6)	
	Very satisfactory	13(11.4)	
Disabled family members	Yes	21(18.4)	
	No	93(81.6)	
Experience of contacting with disabled	Yes	33(28.9)	
	No	81(71.1)	
Experience of servicerelated disabled	Yes	62(54.4)	
	No	52(45.6)	
Number of participations in voluntary work for the disabled	<10	105(92)	2.28±3.89
	≥10	9(8)	
Experience of taking an education course regarding the disabled	Yes	52(45.6)	
	No	62(54.4)	
Income	<1million	5(4.4)	
	1million-3million	52(45.6)	
	>3million	57(50)	

#### B. Schemata about the Disabled

As for schemata about the disabled, the average score was 52.39, and the maximum and minimal scores were 71 and 31 respectively as shown in table 2. The higher score, the more negative schema is. As the average was a bit higher than the median (49.5), it turned out that subjects had a negative schema in general.

Major schemata about the disabled among nursing students included 'difficult', 'complicated', 'weak', and 'dangerous.' In other words, they had negative schemata that the disabled are difficult to handle, complicated, weak, and dangerous.

Table 2: Schema for the Disabled Persons(N=114)

Schema(adjective)	M±SD	Range	Max	Min
schema total	52.39±6.82	1-10	31	71
good-bad	4.98±1.09	1-10	7	1
grateful-ungrateful	5.75±1.15	1-10	8	2
important-unimportant	4.96±1.37	1-10	9	1
ordinary-abnormal	5.32±1.63	1-10	10	1
safe-dangerous	6.06±1.47	1-10	8	2
healthful-weak	6.13±1.43	1-10	8	2
strong-weak	6.32±1.58	1-10	9	1
simple-complicate	6.39±1.41	1-10	9	1
easy-difficult	6.49±1.31	1-10	8	2

### C. Schemata about the Disabled Depending on General Characteristics

As shown in table 3, the difference between groups in schemata depending on general characteristics was analyzed, and as a result, it turned out that the difference in schemata was insignificant depending on the sex, whether there was a disabled member in the family, whether there was an experience of contacting with the disabled, whether they participated in voluntary work for the disabled, whether they ever completed an education course regarding the disabled.

Table 3: Differences of Schema according to General Characteristics (N=114)

Characteristic	Category	N(%)	M±SD	t(p)
Gender	Female	100(87.7)	52.44±6.30	.133(.896)
	Male	14(12.3)	52.07±10.08	
Disabled family members	Yes	21(18.4)	54.29±6.31	-1.413(.160)
	No	93(81.6)	51.97±6.89	
Experience of contacting with disabled	Yes	33(28.9)	52.27±6.21	.121(.904)
	No	81(71.1)	52.44±7.08	
Experience of service related disabled	Yes	62(54.4)	52.58±7.30	-.316(.752)
	No	52(45.6)	52.17±6.25	
Experience of taking an education course regarding the disabled	Yes	52(45.6)	52.10±7.82	.426(.671)
	No	62(54.4)	52.65±5.90	

### D. Correlation between General Characteristics and Schemata about the Disabled

As shown in table 4, an analysis was conducted on the correlation between variables, and as a result, it turned out that the level of satisfaction with the major( $r=-.264$ ,  $p=.005$ ) and the number of participations in voluntary work for the disabled ( $r=-.226$ ,  $p=0.16$ ) were in a negative relation with schemata about the disabled. This result indicates that the level of satisfaction with the major and the number of participations in voluntary work for the disabled are relevant to the formation of negative schemata about the disabled.

Table 4: Correlations between Schema and General characteristics (N=114)

Variable	1)	2)	3)
<sup>1</sup> Satisfaction with the major	1		
<sup>2</sup> Number of participations in voluntary work for the disabled	.166(.078)	1	
<sup>3</sup> Schema	-.264**(.005)	-.226*(.016)	1

\*:  $p<0.05$ , \*\*:  $p<0.01$

### E. Effect of General Characteristics on Schemata about the Disabled

With the level of satisfaction with the major and the number of participations in voluntary work for the disabled as predictors and with schemata about the disabled as dependent variables, a regression analysis was conducted. As a result, the regression expression was significant, and the explanatory power was 8.8% (Adjusted  $R^2= 8.8$ ,  $F=6.433$ ,  $p= .002$ ) as shown in table 5. This result implies that as the number of

participations in voluntary work for the disabled increases and the level of satisfaction with the major are high, it is more likely for positive schemata about the disabled to be formed. According to the hierarchy analysis of variables, the level of satisfaction with the major ( $\beta=-.233, p=.012$ ) was more influential than the number of participations in voluntary work for the disabled ( $\beta=-.188, p=.042$ ). In conclusion, the higher level of satisfaction with the major, and the larger number of participations in voluntary work for the disabled, the more positive schemata are formed among nursing students.

Table 5: Influencing Factors on Schema (N=114)

	Variables	B	$\beta$	t	p
Model 1	Number of participations in voluntary work for the disabled	-.396	-.226	-2.45	.016
	Adjusted R <sup>2</sup> = 4.3 F=6.036, p=.016				
	Variables				
Model 2	Number of participations in voluntary work for the disabled	-.329	-.188	-2.05	.042
	Satisfaction with the major	-2.04	-.233	-2.55	.012
	Adjusted R <sup>2</sup> = 8.8 F=6.433, p= .002				

#### IV. CONCLUSION& DISCUSSION

It is a matter of course that nursing students have the correct awareness of and positive attitudes toward the disabled<sup>6,11,12</sup>. Accordingly, this study aims to examine schemata about the disabled among nursing students and to verify the effect of variables related to schemata. The results are as follows:

First, it turned out that nursing students had negative schemata about the disabled. The schema score in this study is the sum of scores of feelings and thoughts that came up to mind when subjects recalled the disabled: The higher score, the more negative schemata. It turned out that the schema score was higher than the median, which indicates that subjects had negative schemata. This result corresponds to findings of existing researches on the awareness of the disabled. As such, nursing students at college too had a negative awareness of the disabled, which is shared generally in the Korean society<sup>5,6,8</sup>. People's recognition of the disabled is likely to be affected by the nation's social and cultural values. Particularly in Korea, negative prejudices and fixed ideas on the disabled are dominant<sup>13</sup>. The above-mentioned findings imply that such cultural backgrounds are reflected in study subjects. Nursing students, however, are required to develop the correct awareness of and attitudes toward the disabled to form a therapeutic relation with patients, and thus it is problematic that students with such attitudes become medical professionals. Thus, this study demonstrates that there must be educational intervention to reduce such negative attitudes and fixed ideas among nursing students against the disabled.

Particularly regarding the semantic differential scale to analyze schemata about the disabled, the fact that the score of adjectives in the speculative area (complicated, difficult) was higher than that of other evaluative adjectives indicates the firm establishment of deep-rooted negative schemata about the disabled. Dong-hwan Jang<sup>10</sup> explained that speculative adjectives represent the Korean culture of setting count on mental and theoretical values. Thus, the fact that the score of adjectives in this area was relatively high may imply that the socio-cultural values rather than one's own judgment and evaluation on the disabled led to the formation of negative schemata about the disabled. This result corresponds to socialists' assertion that socio-cultural values are the foundation for prejudices against the disabled<sup>13</sup>. In addition, the result of the semantic differential scale test, which was utilized to analyze schemata about the disabled, corresponded to findings of existing researches about the awareness of the disabled, which indicates the significance of this study in that the semantic differential scale is proved useful for the analysis of attitudes toward a certain object and related values by means of adjective groups<sup>9</sup>. Therefore, negative schemata about the disabled that were observed among nursing students in this study reflect general attitudes toward the disabled and related values in the Korean society. Education programs and evaluations at college need to seek ways of abolishing prejudices against the disabled with the aim to help nursing students develop upright attitudes and dispositions as a medical professional.

Second, the difference in schemata depending on subjects' general characteristics was insignificant. The difference between groups depending on the sex, whether there was a disabled member in the family, whether there was an experience of contacting with the disabled, whether they participated in voluntary work for the disabled, whether they ever completed an education course regarding the disabled was

insignificant. This result is different from those of existing researches<sup>8,14</sup>. It is also noteworthy that difference in study tools and characteristics of study subjects make direct comparison impossible. However, it is of great importance to put forth efforts into changing fixed ideas against the disabled through upright education and enlightenment about the disabled. Besides, improving the familiarity with the disabled and minimizing a feeling distance from them is an important approach<sup>13</sup>. Thus, a replication study in this respect is suggested.

Third, the analysis of the correlation between schemata about the disabled and general characteristics shows that there is a significant correlation between the level of satisfaction with the major and the number of participations in voluntary work for the disabled. The regression analysis result shows that the explanatory power is 8.8%. As for the number of participations in voluntary work for the disabled, contacts and interactions are of great importance in eliminating prejudices as stated in existing studies, but mere contacts or interactions between therapists and patients hardly help weakening such prejudices. Rather, contacts at the equal position are effective in reducing prejudices against the disabled<sup>13,15</sup>. In other words, while whether there have been contacts with the disabled, which was one of the general variables, did not affect the difference in schemata significantly, the number of participations in voluntary work for the disabled turned out to have significant effect especially as the number increased. It needs to be demonstrated that consistent and meaningful contacts with the disabled provide new information that can restructure existing schemata about the disabled and reduce negative schemata effectively. Hence, it may need to encourage nursing students to participate in voluntary work for the disabled actively based on the findings of this study, but more importantly, a guidance needs to be provided so that such voluntary work can help forming consistent, meaningful relationships rather than experiencing mere contacts.

In addition, the level of satisfaction with the major proved to be a significant variable that caused positive effect on schemata about the disabled. This supports the assertion of socialists that individuals who are psychologically healthy, have a strong ego, and maintain sound mental strength manifest positive attitudes toward the disabled<sup>15</sup>. The findings of this study and existing researches support the idea that individuals who are highly satisfied with their current positions and situations and maintain positive perspectives on their lives are likely to form positive schemata about the disabled. To reduce negative schemata about the disabled among nursing students, therefore, strategies to enhance their satisfaction with the major need to be developed. To this end, universities should pay keen attention to students' needs and handle them promptly since such efforts will contribute to reducing negative schemata.

In conclusion, two suggestions for educational strategies to reduce negative schemata about the disabled among nursing students are as follows: First, making it mandatory to participate in voluntary work for the disabled may be helpful, but there need to be interventions to use such opportunities to form continuous and meaningful relationships rather than merely to experience simple or superficial contacts so that existing negative schemata can be restructured to positive ones. Secondary, one strategy to enhance nursing students' satisfaction with the major is to pay keen attention to students' opinions and put forth efforts into responding to their needs.

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## Moral Self-Concepts and Self-Esteem among Health-related University Students

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### Abstract---

**Objectives:** The purpose of this study was to evaluate the level of awareness of biomedical ethics, moral self-concepts and self-esteem among health-related university students.

**Methods/Statistical Analysis:** This study employed a cross-sectional survey design. The participants were 268 junior or senior health-related university students in South Korea. The statistical analyses include descriptive statistics of the respondents' general characteristics and the data were analyzed with a t-test and ANOVA by using the SPSS WIN 18.0 program.

**Findings:** The average score for awareness of biomedical ethics was  $2.01 \pm 0.20$  (using a 4-point Likert scale); the scores for self-esteem and moral self-concepts were  $2.04 \pm 0.45$ , and  $2.17 \pm 0.31$  respectively. Awareness of biomedical ethics showed a positive correlation with moral self-concepts ( $r=.157$ ,  $p=.011$ ); and self-esteem showed a positive correlation with moral self-concepts ( $r=.596$ ,  $p<.001$ ). Reproductive ethics ( $r=.124$ ,  $p=.043$ ) and the right to life ( $r=.147$ ,  $p=.016$ ), which are sub-domains of awareness of biomedical ethics, also showed positive correlations with moral self-concepts.

**Improvements/Applications:** The results of this study suggest that education on biomedical ethics should focus primarily on reproductive ethics, the right to life, and the ethics of death.

**Keywords---** Awareness, Biomedical Ethics, Moral Self-Concepts, Self-Esteem, Health-Related University Students.

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## I. INTRODUCTION

### A. *Necessity of Study*

With the development of science and technology, speed of social change is accelerating and scope of change is widening in modern society with its trend of modernization, informatization and globalization. In addition to this change, brilliant development of life science has made application of innovative new technologies to diagnosis and treatment of diseases possible, enabling treatment and management of diseases which were previously unavailable. However, along with positive developments such as solution to intractable diseases, infertility, physical disabilities and prolongation of life, advent of technology which can produce human clones through embryo of cloned somatic cells has caused change in the recognition on the dignity of human beings and life. 21st century has witnessed new ethical problems related to human life such as the enactment of laws on bioethics and safety which prohibits implantation of human somatic cell embryo in women's uterus, which requires new ethical interpretation and assessment and establishment of values.

Especially, as remarkable development of biomedical science in the area of conception and childbirth has made conception of life an area controllable by human will, not that of God's providence, arguments are being raised that legal standards should be made for donation of reproductive cells and systems should be vitalized to guarantee women's reproductive right.<sup>1</sup> Conception becomes possible though in vitro fertilization and artificial insemination and supplementary reproductive technologies have become biomedical technologies which actively contribute to conception of life. In these processes, various medical technologies are used such as controlled ovarian hyper stimulation, ovum collection, formation of embryos, embryo transplantation and genetic diagnosis on embryos, which have raised ethical controversies regarding women's reproductive health such as birth through surrogate mother, artificial abortion and protection of ovum donors. In addition, ethical controversies on the dignity and value of human life are continuing such as conflict on meaningless prolongation of life for patients without spontaneous respiration who sustain life with high-tech medical equipments like artificial respirators, heavy burden of medical cost for expensive medical equipments, demand to stop treatment for such reasons and issues related to euthanasia.<sup>2</sup>

As complex and diverse bioethical problems are presented in medical fields, health professionals are facing difficulties in ethical decision-making as ethical assessments fall short of the progress of high technologies and development of medical technologies. Many medical professionals experience confusion and moral conflict due to difficulty in decision-making in clinical settings, various ethical values and improvement of patients' consciousness of their rights and suffer from negative and painful moral agony when they cannot perform moral behaviors or change situations.<sup>3</sup>

Awareness of biomedical ethics is the very foundation of ethical problem-solving process which is directly linked with medical behaviors and thus, establishment of right values will work as driving force for desirable decision-making in medical and healthcare system and help medical professionals. As health science majors deal with diseases and treatment of humans, it is important for universities to lead them to be equipped with sense of responsibility in bioethics and help them to make right and ethical decisions. Bioethical consciousness of students of health science who will lead future medical area as medical professionals is the very foundation of resolving process of ethical problems related to patients.<sup>4</sup>

Moral self-concept is moral self-image perceived by an individual. Individuals interact within society they belong to and, in the process, share views and emotions with others and form moral self-concept by moral expectations and evaluation of other people. It is necessary to strengthen the moral self-concept to enhance medical professionals' moral sensitivity as the two have positive relationship with each other. Greipp mentioned that it is vital to enhance moral self-concept to improve practice of moral concepts since humans decide direction for behaviors based on self-concept they possess and are affected by it in practicing them.<sup>5</sup> Moral sensitivity which is similar to moral self-concept is an ability to understand moral problems in certain circumstances and to recognize process of various behaviors, a psychological process which requires empathy, an essential factor in initial ethical decision-making and an ability to complete the process of recognition. Moral sensitivity is deemed to be formed on the basis of moral self-concept and such establishment of values can help decision-making in various ethical problem-solving processes faced in clinical fields.

Self-esteem is an understanding of self as a special being and can be explained as a degree to which how valuable one feels one is with positive or negative attitude. Medical professionals with high self-esteem form

productive professional self-concept as they have positive understanding and opinion on themselves and the higher one's self-esteem is, the better their social relationship and adaptation to surrounding environments.<sup>6</sup>

It is known that the higher the idealistic ethical tendency which tends to make judgment based on behaviors alone rather than results and the higher the self-esteem, the higher the perception on the protection of medical information, and the higher the idealistic ethical tendency and standards for specialized organizations, the higher the level of ethical job behaviors.<sup>7</sup> Thus, as people with high self-esteem think they are leading worthy and rewarding lives and behave with confidence, they are motivated to perform positive behaviors and have high ethical awareness on biomedical activities.

Recently, more importance has been placed on patients' rights and high level of ethical awareness is demanded for medical professionals. Health care professionals are required to perform responsible behaviors as advocators and guardians of the patients since they have responsibilities and duties to protect patients, make decisions and participate in decision-making processes which can affect the patients' lives. Thus, it is critical to enhance awareness of biomedical ethics in health-related university students as future healthcare professionals and proper educations should be implemented by reflecting ethical issues of the times.

Investigation on the level of bioethical awareness and related factors is judged to be vital in suggesting directions for future ethical education in universities. This study provides basic material for the provision of desirable ethical education for students majoring in healthcare and the development of contents for the education.

### ***B. Purpose of the Study***

The purpose of this study is to investigate the level of awareness of biomedical ethics, moral self-concept and self-esteem of the university students majoring in healthcare and relationship among them. Detailed purposes are as follows;

- 1) To investigate subjects' general characteristics.
- 2) To investigate subjects' level of awareness of biomedical ethics, moral self-concept and self-esteem.
- 3) To investigate difference in subjects' level of awareness of biomedical ethics, moral self-concept and self-esteem based on their general characteristics.
- 4) To investigate relationship among subjects' level of awareness of biomedical ethics, moral self-concept and self-esteem.

## **II. SUBJECTS AND METHODS**

### ***A. Design of Study***

This study is a descriptive correlation research to measure the level of awareness of biomedical ethics, moral self-concept and self-esteem of the university students majoring in healthcare and to investigate the relationship among them.

### ***B. Subjects of Study***

The subjects of this study were junior and senior students selected by convenience sampling from departments related to healthcare and medical treatment (Department of Nursing Science, Department of Emergency Rescue, Department of Clinical Pathology and Department of Healthcare Administration) in a university located in Gyeongbuk regions.

The size of the sample of this study was calculated according to statistical test method by using G\*power 3.10 program. As the result, proper size of the sample for analysis of correlation was 138 subjects based on significance level ( $\alpha$ ) of 0.05, power ( $1-\beta$ ) of 95% and effect size of ( $r$ ) 0.3. Assuming the dropout rate of 20%, the number of subjects required was 166.

Since this study was conducted based on grade of each department and, hence, it was difficult to grant right of selecting questions to a part of students, questionnaires were distributed to all students who expressed intention to participate in the study. As the result, a total of 280 students participate and, among them, 268 students' questionnaires were finally used for analysis except for the ones who dropped out of the study and ones with errors. As the result of post test on the appropriateness of the size of the sample, power of test for 268 subjects was 95%, satisfying the standard for sample size of established at the time of study design.

### **C. Study Tools**

#### **Awareness of Biomedical Ethics**

For awareness of biomedical ethics, this study used the questionnaire on ethical problems of reproduction and the questionnaire on bioethics which were reconstructed<sup>8</sup> into a total of 49 questions in 9 domains, which was reconstructed again. This tool was composed of 5 questions on fetus' right to life, 6 questions on artificial abortion, 6 questions on artificial insemination, 5 questions on diagnosis on fetus, 5 questions on premature baby's right to life, 5 questions on euthanasia, 4 questions on organ transplant, 5 questions on brain death and 7 questions on human bioengineering. Sub-domains were divided into reproductive ethics (artificial insemination, artificial abortion), ethics on right to life (fetus' and premature baby's right to life), ethics on treatment (diagnosis on fetus, organ transplant, human bioengineering) and ethics on death (euthanasia, brain death) and each question had 4-point interval scale from 4-point 'Agreed' to 1-point 'objected.' The higher the score, the higher the awareness on biomedical ethics respecting human life and negative questions were inversely treated. Value of Cronbach's  $\alpha$  was .81 in study<sup>9</sup> and .69 in this study.

#### **Moral Self-Concept**

This study used Korean-style test for moral self-concept based on Fitts' test<sup>10</sup>, which Ye Sook Seodeleted one overlapping question from and reorganized. This tool was composed of 17 questions in 4-point scale and the higher the score, the higher the moral self-concept. Value of Cronbach's  $\alpha$  was .84 in study<sup>11</sup> and .70 in this study.

#### **Self-Esteem**

Self-esteem was measured with the tool developed by Rosenberg<sup>12</sup> and adapted. The tool was composed of a total of 10 questions which contained 5 questions on positive self-esteem and 5 questions on negative self-esteem, which were constructed in 4-point interval scale from 4-point 'totally agreed' to 1-point 'cannot agree at all.' The higher the score, the higher the self-esteem and Value of Cronbach's  $\alpha$  was .83 in Young Ho Lee's study<sup>13</sup> and .78 in this study.

### **D. Data Collection**

Data were collected from May to July 2016 after gaining cooperation from related departments, explaining the purpose and method of the study to the subjects and obtaining letter of consent from them to participate in the study. Self-administered questionnaires which acquired approval as a research tool were distributed and collected by a researcher and a research assistant and time required to fill out the questionnaire was 15 minutes. Explanation was made to students that collected data shall not be made public except for study purposes and personal information of the subjects shall remain confidential and their anonymity shall be guaranteed.

### **E. Method of Analysis**

Collected data were statistically analyzed and methods of analysis were as follows;

- 1) Subjects' general characteristics were analyzed with numbers and percentage.
- 2) Subjects' level of awareness of biomedical ethics, moral self-concept and self-esteem were analyzed with mean and standard deviation.
- 3) Difference in the level of awareness of biomedical ethics, moral self-concept and self-esteem based on the subjects' general characteristics were analyzed with t-test.
- 4) Relationship among subjects' level of awareness of biomedical ethics, moral self-concept and self-esteem were analyzed Pearson's correlation.

### **F. Limitations of Study**

As this study has limitation that it selected subjects from students of healthcare and medical departments of a university by convenience sampling, caution should be taken in generalizing the results.

### **G. Moral Considerations**

Participants of this study were the students who voluntarily agreed to participate after being explained its purpose. In addition, explanation was provided that the results drawn out from the process of explaining the participation and filling out questionnaires shall not be used other than study purposes, shall be anonymously treated and the participation shall be stopped anytime when requested.

### III. RESULTS

#### A. General Characteristics of Subjects

Subjects of this study were 68 males (25.4%) and 200 females (74.6%) and 217 subjects (81.0%) had religions while 37 subjects (13.8%) had medical professionals in their family. 82 subjects (30.6%) had family history of chronic diseases and 185 (69.0%) had the experience of having donated blood. Majority (241 subjects, 89.9%) had experience of education on biomedical ethics and 103 subjects (38.4%) had the experience of having contemplated or agonized over the problems of medical ethics while 165 subjects (61.6%) didn't have the experience. 185 subjects (69.0%) hope to participate in education on medical ethics and 235 subject (87.7%) perceived expanding problems of medical ethics with the development of medical technology is shown in Table 1.

Table 1: Epidemiologic Characteristics of Subjects

Characteristics	(N=268)	
	n	%
Sex	Male	68 25.4
	Female	200 74.6
Religion	Yes	217 81.0
	No	51 19.0
Have a healthcare professional in family	Yes	37 13.8
	No	231 86.2
Have a chronic disease in family	Yes	82 30.6
	No	184 69.4
Experience of blood donation	Yes	185 69.0
	No	83 31.0
Experience of Biomedical Ethic education	Yes	241 89.9
	No	27 10.1
Have concerned about biomedical ethics problems	Yes	103 38.4
	No	165 61.6
Wish to attend educational programs about biomedical ethics	Yes	185 69.0
	No	83 31.0
Acknowledgement of biomedical ethics problems due to the advance of medical technology	Yes	235 87.7
	No	33 12.3

#### B. Subjects' Awareness of Biomedical Ethics, Moral Self-Concept and Self-Esteem

Subjects' awareness of biomedical ethics was moderate  $2.01 \pm 0.20$  points in the range of 1-4 point range and among the sub-domains, ethics on death (euthanasia, brain death) was the highest  $3.30 \pm 0.23$  points followed by ethics on reproduction (artificial insemination, artificial abortion) with  $2.20 \pm 0.26$  points, ethics on treatment (diagnosis on fetus, organ transplant, human bioengineering) with  $1.92 \pm 0.35$  points and ethics on right to life (fetus' and premature baby's right to life) with  $1.73 \pm 0.35$  in descending order.

Scores of moral self-concept and self-esteem were  $2.04 \pm 0.45$  points and  $2.17 \pm 0.31$  points respectively within the range of 1-4, showing moderate levels are shown in Table 2.

Table 2: Biomedical Ethics Awareness, Moral Self-Concepts, and Self-Esteem of Subjects

		Range of Scale	Mean $\pm$ SD
Biomedical ethics awareness		1~4	2.01 $\pm$ 0.20
Sub-domain	Reproductive ethics	1~4	2.20 $\pm$ 0.26
	Ethics for right to life	1~4	1.73 $\pm$ 0.35
	Clinical ethics	1~4	1.92 $\pm$ 0.35
	Ethics of death	1~4	3.30 $\pm$ 0.23
Moral self-concepts		1~4	2.17 $\pm$ 0.31
Self-esteem		1~4	2.04 $\pm$ 0.45

**C. Difference of Subjects' Awareness of Biomedical Ethics, Moral Self-Concept and Self-Esteem Based on General Characteristics**

Level of awareness of biomedical ethics based on subjects' general characteristics showed significant difference depending on the experience of having attended bioethics education ( $t=-2.387, p=.018$ ) and the degree of hoping to attend bioethics education ( $t=-2.306, p=.022$ ). (Contrary to popular belief,) Subjects with experience of having attended bioethics education had lower level of awareness of biomedical ethics than those with no experience. Females had statistically significantly higher level of moral self-concept than males ( $t=-2.802, p=.005$ ) and females also had statistically significantly higher level of self-esteem than males ( $t=-2.161, p=.032$ ), shows Table 3.

Table 3: Biomedical Ethics Awareness, Moral self-Concepts, and Self-Esteem According to General Characteristics

(N=268)

		Biomedical ethics awareness		Moral self-concepts		Self-esteem	
		Mean±SD	t (p)	Mean±SD	t (p)	Mean±SD	t (p)
Sex	Male	2.04±.22	1.310	2.55±0.38	-2.802	2.52±.38	-2.161 (.032)
	Female	2.00±.19	(.191)	2.68±.32	(.005)	2.63±.33	
Religion	Yes	2.02±.20	.549	2.64±.34	-1.257	2.59±.34	-.637 (.525)
	No	2.00±.21	(.583)	2.71±.32	(.210)	2.63±.35	
Have a healthcare professional in family	Yes	2.02±.22	.226	2.61±.35	-.762	2.57±.34	-.510 (.610)
	No	2.01±.20	(.822)	2.65±.34	(.447)	2.60±.35	
Have a chronic disease in family	Yes	1.98±.20	-1.784	2.62±.29	-1.182	2.57±.36	-.916 (.362)
	No	2.03±.20	(.076)	2.67±.36	(.238)	2.61±.33	
Experience of blood donation	Yes	2.01±.19	.265	2.67±.33	.469	2.61±.34	.454 (.650)
	No	2.00±.21	(.791)	2.65±.33	(.639)	2.59±.35	
Experience of biomedical ethic education	Yes	2.00±.20	-2.387	2.65±.33	-.167	2.60±.34	.436 (.663)
	No	2.10±.19	(.018)	2.66±.40	(.867)	2.57±.38	
Have concerned about biomedical ethics problems	Yes	2.00±.21	-.806	2.64±.33	-.338	2.62±.31	.954 (.341)
	No	2.02±.20	(.421)	2.65±.35	(.735)	2.58±.37	
Wish to attend educational programs about biomedical ethics	Yes	1.99±.20	-2.306	2.65±.36	.112	2.59±.36	-.495 (.621)
	No	2.05±.19	(.022)	2.65±.29	(.911)	2.62±.31	
Acknowledgement of biomedical ethics problems due to the advance of medical technology	Yes	2.00±.20	-1.736 (.084)	2.65±.34	-.741 (.459)	2.59±.34	-1.829 (.068)

**D. Relationship among awareness of biomedical ethics, moral self-concept and self-esteem**

As the result of analysis of relationship among variables, awareness of biomedical awareness had positive (+) relationship with moral self-concept ( $r=.157, p=.011$ ) and moral self-concept had positive (+) relationship with self-esteem ( $r=.596, p<.001$ ) is shown in Table 4.

Table 4: Correlation between Biomedical Ethics Awareness, Moral Self-Concepts, and Self-Esteem

(N=268)

	Moral self-concepts	Self-esteem
	r (p)	r (p)
Biomedical ethics awareness	.157 (.011)	.067 (.278)
Moral self-concepts		.596 (<.001)

**E. Relationship between Sub-Domains of Awareness of Biomedical Ethics and Moral Self-Concept and Self-Esteem**

As the result of additional analysis on the relationship between sub-domains of awareness of biomedical ethics and each variable, among sub-domains of awareness of biomedical ethics, ethics on reproduction (artificial insemination, artificial abortion) ( $r=.124, p=.043$ ) and ethics on right to life (fetus' and premature baby's right to life) ( $r=.147, p=.016$ ) had positive relationship with moral self-concept is shown in Table 5.

Table 5: Correlation between Sub-Domain of Biomedical Ethics Awareness, Moral Self-Concepts and Self-Esteem

(N=268)

		Moral self-concepts	Self-esteem
		r (p)	r (p)
Biomedical ethics awareness	Reproductive ethics	.124 (.043)	-.019 (.762)
	Ethics for right to life	.147 (.016)	.099 (.107)
	Clinical ethics	.101 (.101)	.053 (.384)
	Ethics of death	.032 (.607)	-.039 (.523)

**IV. EXPLORATION**

This study aimed to investigate the interest in ethical education, awareness of biomedical ethics and relate factors to establish desirable medical ethics for university students majoring in healthcare.

Some students majoring in healthcare had the experience of having contemplated or agonized over medical ethics (38.4%) and many students expressed wish to attend education on medical ethics (69%) and were aware of increasing problems of medical ethics (87.7%). Awareness of biomedical ethics of students majoring in healthcare scored moderate  $2.01 \pm .20$  points and, in the sub-domains, ethical awareness was high in the descending order of ethics on death, ethics on reproduction, ethics on diagnosis and ethics on right to life. These results were somewhat lower than those of study on nursing students by Wha Young Choi<sup>14</sup> and Hyun Sook Jeon<sup>15</sup>. Although it is difficult to compare this study directly with theirs since subjects of this study were university students majoring in healthcare and the study included students of departments not classified as medical professionals, the results of this study are deemed to reflect the characteristics of subjects as those of Hyun Sook Jeon's study in which non-nursing students tended to have lower awareness of biomedical ethics than nursing students.

In addition, awareness of biomedical ethics had no difference whether subjects had family members with chronic diseases or medical professionals in their family. Nonetheless, the awareness exhibited significant difference depending on the experience of having attended education on bioethics and the degree of hoping to attend education on bioethics. However, those with experience of having attended education on bioethics and hoping to attend education on bioethics had lower level of awareness of biomedical ethics than those without experience of education or do not want to attend the education, which is contrary to general expectation. As this study assessed ethical education experience without defining exact concept of the education on biomedical ethics, there are possibilities that students might have assessed that they had experience of education only with the experience of learning limited parts of bioethics or gaining knowledge from the process of life-sharing behaviors such as donation of blood or hematopoietic stem cell and from hearing some experts' explanations. It is necessary to find out detailed reasons why students with bioethics education had lower ethical awareness even if the education was only partial and plans should be made to enhance the efficiency of ethics education in such ways as with what contents, when and in what methods the educations should be conducted. That is, it is necessary to investigate the themes and contents of ethics education in detail and review if education and programs on medical ethics are effectively provided and applied. This implies that, in order to enhance awareness on ethics, ethics education must be conducted in proper themes and contents during this period of university.

Awareness of biomedical ethics had positive relationship with moral self-concept and especially, in the sub-domains, ethics on reproduction (artificial insemination, artificial abortion) and ethics on right to life (fetus' and premature baby's right to life) had statistically significantly positive relationship with moral self-

concept. However, ethics on death such as euthanasia and brain death and ethics on diagnosis such as diagnosis of fetus, organ transplant and human bioengineering had no statistical significance.

University years is the period of conversion from adolescence to adulthood when students have practical experience and problems related to reproductive health such as pregnancy and abortion. Thus, study results are deemed to reflect ethical conflicts and considerations related to ethics on reproduction among awareness of biomedical ethics rather than organ transplant, euthanasia and brain death.

A domestic study on university students' sexual experience reported that 38.1% have sexual experience and among them, 11.6% had experience of pregnancy, 94.4% of whom had abortion.<sup>16</sup> Jung Ae Kim and Jung Ryeol Lee reported that 65.5% of university had sexual experience and argued that sex is recognized as a natural part of being adults by university students and thus, it is necessary to present specific and realistic directions for them.<sup>17</sup> With the spread of internet and change of social and environmental factors, university students came to have distinctly different attitude toward sex from previous generations and it is necessary for professors and instructors to recognize changes in their ethical awareness and values.

Although university students are legally adults, they are still immature in sexual experience and following pregnancy and childbirth and hence, sexual impulse during university years may lead to unwanted pregnancy and complications due to improper measures after pregnancy and sometimes, dates can also lead to wanted sexual experience and even sexual violence.<sup>18</sup> To sum up, it is deemed to be proper that ethics education during university should include ethics on reproduction such as artificial insemination and abortion and fetus' and premature baby's right to life along with basic human rights. There was no relationship between awareness of biomedical ethics and self-esteem, awareness of biomedical ethics had positive relationship with moral self-concept and self-esteem also had positive relationship with moral self-concept. Thus, education for the formation of right moral self-concept and self-esteem can be a good way to enhance awareness of biomedical ethics in university students majoring in healthcare.

Healthcare professionals may confront ethical dilemmas while helping patients and their family members make ethical decisions which hospitals propose or advocating patients in their positions. Proper awareness of biomedical ethics helps student settle problems related to traditional ethics and social customs such as pregnancy, birth and death.

## **V. CONCLUSION AND SUGGESTIONS**

This study is expected to be utilized as educational material for the establishment of right awareness of biomedical ethics of students majoring in healthcare. Students majoring in healthcare are required to be educated so that they will protect and respect patients' human rights based on respect for human life and humanitarian considerations when they provide medical services in various areas of nursing, diagnosis, caring and treatment, and bioethical education must be performed by selecting appropriate themes which fit university students' interests, conflict and problems. Timely and appropriate ethics education is expected to enhance awareness on ethics on reproduction and right to life and boost the will to practice.

This study is a descriptive correlation research to investigate the level of awareness of biomedical ethics, moral self-concept and self-esteem of the university students majoring in healthcare and relationship among them. Awareness of biomedical ethics was measured by using the questionnaire on ethical problems of reproduction and the questionnaire on bioethics which were reconstructed, which was reconstructed again. Moral self-concept was measured with Korean-style test developed Won Sik Jung based on Fitts' self-concept test. Subjects of the study were 268 junior and senior students majoring in healthcare of a university located in Gyeongbuk regions.

As the result of the study, subjects' awareness of bioethics, moral self-concept and self-esteem recorded  $2.01 \pm .20$ ,  $2.04 \pm .45$  and  $2.17 \pm .31$  points respectively, showing moderate levels. Awareness of biomedical ethics had positive relationship with moral self-concept and self-esteem also had positive relationship with moral self-concept. In the sub-domains of biomedical ethics, ethics on reproduction (artificial insemination, artificial abortion) and ethics on right to life (fetus' and premature baby's right to life) had positive relationship with moral self-concept.

This study is expected to be utilized as educational material for the establishment of right awareness of biomedical ethics of students majoring in healthcare. Considering the characteristics of university period, education on biomedical ethics for university students must focus on development and application of

practical educational contents which fit university students' interests, conflict and problems by including ethics on reproduction and right to life.

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## A study on the Perception and Experiences of Danuri Call Center Staff Members' Services Focusing on Focus Group Interview (FGI)

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**Abstract---** The objective of this study is to draw out method of functional improvement and development of Multicultural Family Helpline, recognized from the perspective of those working for the center, through qualitative research regarding the awareness and experience related to service, with the workers of Danuri Call Center, established for multicultural families, as the subjects. A focus group interview was conducted regarding service function awareness, and about the demanded professional competency, with 8 workers from the Danuri Call Center as the subjects.

**Keywords---** Danuri Call Center, Multicultural Family, Focus Group Interview, Professional Competency, Performance Evaluation.

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## **I. INTRODUCTION**

Tinged multicultural family issues also depending on the various aspects related to climate change and multicultural families, migrant women and men, and their children have the problem appears to complex forms including women migrant individual, marital, parental relationships. Therefore, we reach a point you need to find a new switch on multicultural family support policy for social adaptation and integration for multi-cultural families.

For the countries that the immigrant societies had been already developed, the types of immigration were various and they approached the immigrants to help their adaptations in a variety of ways. For example, the type of 'family immigration' in America is that naturalization persons or permanent residents invite their family in their countries, while the type of 'marriage immigration' in Asia is to invite the spouses overseas only with marriage. Of course, there are similar cases of marriage immigrations in Europe or America, which is very limited. They pay attention to the immigrant families by policy in those countries, however, they do not take any specific action to the multicultural families consisting of 'the country people with foreign spouses, because the married immigrants are adapted to the local society well by 'family resilience.'<sup>10,11</sup> Recently, the government or private organizations performed a variety of activities<sup>4,6,7,12</sup> to provide the required services to the foreign immigrants and conducted the multiple studies on the multicultural families<sup>2,3,5,8</sup>. In Korea, comprehensive information call services are provided to support the adaptations of the foreigners by Korea Immigration Service of Ministry of Justice, Ministry of Employment and Labor, and Ministry of Gender Equality and Family. Especially, Danuri call center (1577-1366) under Ministry of Gender and Equality and Family provides the married immigrants who suffer from the difficulties in the early adaptation in Korea with the systemic adaptation supports, including human right protection and emergency support on the victims of violence and the conflicts caused by the differences of languages and culture. They provide the immigrant women of multicultural families with the services such as crisis counseling, emergency supports, provision of information on the Korean life, interpretation, and three-party telephone assists with 13 languages<sup>11</sup>.

Danuri call center in Ministry of Women and Family provides the married immigrants who suffer from the initial adaptation to the Korean life with systemic adaptation supports and does the immigrant female victims of the violence caused by the conflicts from the differences of language and culture in the multi-cultural families with the human right protection and emergency supports<sup>9</sup>.

Hence, this study aims to seek the improvement and development plans of comprehensive information call center for the multi-culture families perceived by the employees of Danuri call center through the qualitative research on the recognition and experiences on the services.

## **II. RESEARCH METHODS AND PROCEDURE**

### **A. Research Problems**

- 1) What do they think about the recognition on the services of the employees?
- 2) What are the required professional competencies perceived by the employees?
- 3) What is the perception on the service performance evaluation by the employees?

### **B. Research Subject and Method Of Data Collection**

Focus group interview was conducted with the interview subjects of 8 employees who work for Danuri call center (1577-1366). FGI was conducted by the groups from August 11<sup>th</sup> to 27<sup>th</sup>, 2015 to take about 1.5 to 2 hours. Open questions were used in the recognition on the services and required professional competencies, and all the courses were recorded and dictated upon their consents.

### **C. Analysis Method**

Spiral qualitative data analysis was used for the analysis method of FGI contents<sup>1</sup>. First, the investigator read the whole dictated article several times to provide them with the interview feeling and then concentrated the detailed contents. After that to perform the systematization and switching process of the data, the investigator switched the original article into proper unit of study subjects for the analysis. Third, the investigator described the data in detail, developed the topics and dimensions according to the classification system, and interpreted them in view of the investigator's perspective or previous literatures.

### III. RESULTS

Upon the analysis results of Focus Group Interview as seen in Table 1, three categories on the service functions were described to get the detailed outcomes including 'recognition of service functions,' 'required competencies,' and 'evaluation and compensation for services.'

Table1: The Results of Focus Group Interview

Category	Sub-category
Recognition of service function	Danuri call center for the general counseling of immigrant women
	Emergency counseling of immigrant women vs. support of adaptation for multicultural families
	Role determination by community network
	Require clear guideline from central government and expansion of decision making authority in the community center
Required competency	Parallelization of basic counseling skill and specialized technique
	Capability to develop crisis intervention system for emergency support
Evaluation and compensation for services	Performance evaluation without special treat for the experienced employees
	Stress from multi-tasking works
	Isolated dedicated personnel that works for the isolated people
	Client to dedicated personnel, strengthening competency of dedicated personnel and healing by self service
	Passion payment: Work for clients with unlimited service minds

#### A. Recognition on the Service Function

##### **Support for the Married Immigrants and the Whole Immigrant Women**

The managers in Danuri call center among the participants recognized it as one-stop support center for the Korean life of all the immigrant women including women in multi-cultural families. They said it provided with not only emergency counseling but also vast scopes of interventions from the start up to the conclusion if the counseling was initiated. It reveals that the most important function in Danuri call center is one-stop service of the emergency counseling for the immigrant women and Danuri call center is the representative institution that has the professional competency on the immigrant women in the Korean society.

The centers have been doing even the difficult works that the employees in multicultural family support center cannot imagine. Upon the review of visa qualifications for the immigrants, 40% was female out of 1.7 million foreign residents, and the most frequent visa qualifications were F-4 (overseas Korean), followed by E-9 (employment as non-specialists), F-1 (visiting live together), F-2 (inhabitants), F-3 (accompanying), while the ratio of the marriage immigrants were only 13%. From the later part of Article 2 in the rule related to comprehensive information call center for multicultural families (Article 11 in Multicultural Family Support Act), the contents on the immigrants, especially for women are very extraordinary exceeding the rules, which can be operated by integration with emergency call center (Manager 2, Danuri call center).

##### **Strengthening Crisis and Living Settlement Supports after Integration of the Call Center**

Since multi-cultural family support center is the 1st priority institution that multi-cultural families are seeking, its employees are proud of their work scope of settlement supports such as life security and adaptation.

Since the managers in Danuri call center deals with a variety of topics on the immigrant women unlike the counseling focused on the married immigrant women and families in the multi-cultural family support center, they answered to be differentiated from the services in the multi-cultural family support center. This reflects the satisfaction of the users in Danuri call center on the services that provided with translation as well as customized counseling to their cases.

The counseling contents are different from those in Multicultural family support center. We got the tasks from the immigrant groups working on Sundays, shelters for married immigrants, and shelters for women in sex industry, which were surprisingly different. The contents were so dynamic that the employees in multicultural family support center cannot imagine (Manager 2, Danuri call center).

### ***Development of Efficient Network using by Community Network***

Although the roles of multicultural family support center and Danuri call center are redundant in terms of counseling for the married immigrants, the most important thing is for both institutions to perform utilizing the strengths in alignment with the community since they deal with different topics and areas. Also, those who were female victims of the violence or immigrant women under control by confinement or watch seemed to experience difficulties in getting the instant help where the community center was not available.

Of course, if they request the help from multi-cultural family support center or other related institution, they can get the help and visit from them. However, when the client wants to be rescued faster or when she ask the help to the other related institution due to lack of community center, it may occur the delay of support due to the differences of the status recognition and counter actions by the persons in charge.

Community centers request external resources so often due to the lack of counseling center for immigrant women, while I think Danuri call centers take that function naturally. However, many cases were not to be recognized, and it should strengthen the area of counseling, or there may be the areas not to be covered due to the small number of community centers. In my opinion, it should be prepared with the alternatives such as expansion of number of community centers, and developing 16 bases on the hierarchy with the function of Danuri call center or crisis management....(Manager 1, Danuri call center)

### ***B. Competencies Required for the Service Personnel***

There were similarities and differences on the competencies required for the counseling dedicated employees among the actual counselors, heads of the centers, and users. Managers and actual staff members showed the similar viewpoints to provide with basic counseling skill and emergency support services, while the latter complained the difficulties in their effort to have the competencies with their own money together with working. Lastly, the users rated the most desired attitude from the counselors with the sensitivity of multi-cultures and it seems to be required for the objective strategy on the emergency support system and behavioral technique beside counseling skill.

### ***Improvement of Basic Counseling Skill and Professional Capability***

The counselors for the immigrant women in Danuri call center answered that the counseling with the same country person would be very effective in the other country where the culture is different. However, they wanted to have more frequent opportunities to improve their professional counseling skill with the continuous training.

Above all, I think listening is the most important one. I counsel in Vietnamese, which is different when Korean counselor exists. When I came to Korea initially, it was so magnificent to have the person who could listen and understand my talking (Employee 7 in Danuri call center)

### ***Development of Crisis Intervention Capability***

Since the counseling function provided by Danuri call center is the process to help the client's emotional recovery and seek the causes of problems so as to solve them, it is clearly differentiated from the simple translational works. Because the translation as well as the counseling should be simultaneously performed in the counseling for the married immigrant women, its role definition might not be clear, however, the roles of the counselors for the immigrant women seem to be significant. Development of rapport with the clients from the same country, the immigrant female counselor can enhance the emotional stability and credibility of the subjects and increase the counseling effect

### ***C. Perception on the Service Performance Evaluation***

#### ***Performance Evaluation without Preferential Treatment to the Experienced Persons***

Although both Danuri call center and multicultural family support center strived for problem solving and strengthening competency of the subjects, both institutions were not well evaluated on their performances. The systems for evaluation and compensation were required to treat the experienced persons in the organization better. With respect to the compensation of human resource system, not only cost aspect but also the internal competency expansion and effective utilization were required by the differences of tasks and positions for the experienced persons in the organization. As far as I understand, those who play roles well as the specialists are treated as good as the ordinary counselors.

It would be better that they have the internal hierarchy to have the roles or positions as the mentors or seniors so as to utilize the internal competency fully. (Manager 1, Danuri call center)

### ***Work Stress Due to Multiple Functions***

Employees are perceived that the work in the organization is hard to describe clearly by the positions. In case of community center, Korean counselors and heads of community centers reported that lowering concentration and burn-out were frequently occurred according to the multiple functions such as a variety of administrative works besides counseling. High level of stress and unclear job scope in these professionals are related to lower the quality of services, resulting in the damage to the clients, which the rapid improvement is essential.

The staff members generally consist of 6 counselors, 1 Korean counselor, and head of the center. Out of 6 or 7, or 8 members at maximum, the counseling function shares approximately 90%. The roles of Korean counselor cover most of the administrative works including accounting and office administrations. Head of the center supervises on overall area of counseling and performs external networking activities, so she cannot concentrate the work since the role and responsibility is not clear (Manager 1, Danuri call center).

### ***They Worked for the Isolated but Actually they are the Isolated***

Practically in case of counseling specialists, it is required to train them on the development of emergency crisis system besides basic counseling skill, however, the supporting system on this is excluded legally, resulting in the hopelessness.

In other words, these counselors are responsible for the immigrant married women isolated from the policies such as connection to domestic support system and activities as the intermediary to connect to the domestic resources (e.g. vicarious execution for court administrative process, etc.) if they become illegal immigrants due to the problems on the marriages.

However, they feel the isolation due to the lack of supports on the enhancement of professionalism that they experience during the task. From the actual counseling in these professionals, they should be backed up by professional knowledge and skill trainings such as advanced counseling skill, crisis management capability, case managements, and so on, besides basic counseling, in case the services that they should perform are family violence, sexual violence, etc. However, they may experience the isolation and anger from the fact that there is no legal evidence to support like continuous education for these from the local government or Ministry of Gender Equality and Family.

*Even for refreshing trainings on family violence and sex violence, we are not related. I wish Ministry of Gender Equality and Family can arrange this, however, it becomes more difficult since its responsibility is shifted into Department of Multicultural Family Support. Because it was managed by Department of Welfare Support in Ministry of Gender Equality and Family. (Manager 1, Danuri call center)*

### ***Client to the Dedicated Persons, Strengthening Their Competency, and Healing by Self-Services***

If the client at the site comes to the dedicated person, she can get the supports on the problem solving and strengthening competency from the services. However, the recovery of dedicated person from strengthening competency and burn-out would be solely on the person. For the social workers or counselors who have similar careers, the organization systems were developed to protect the dedicated personnel such as Practical Ethics Charter, Association of Social Workers for psycho-emotional supports on their burn-out. Nevertheless, the fact that continues to occur the suicides of civil servants dedicated for social welfare recently suggests requiring aggressive protections for the employees of emotional labor. Yet, the level of protection system is currently limited for the dedicated personnel in Danuri call center to prevent psycho-emotional burn-out or to strengthen the competency. If they do not seek the measures by themselves to solve the problems including excessive civil appealing, rudeness, psycho-emotional burn-out, and so on of the clients, they express high level of turnover intention. In addition, they are hesitant to ask the peers or supervisors whenever the situations requiring in-depth counseling skill are occurred.

Then, they use the expression of self-deprecation, 'healing by self-service.'

*In my case, I read the articles or books, if any. We don't have the budget for training so if the external training course is held for free. We attended the trainings held in Community Welfare Foundation so frequently. Then, perform cascade training to have indirect training. I think the technical matters should be continuously*

*dealt including psychology counseling and solution oriented counseling. In fact, we can do the trainings on law and supporting system at any time. Those stuffs can be all right with continuous update, I don't know. For those, I can manage them in a certain degree. However, I think I need the skills how I can respond and talk whenever I meet the families (Manager 3, Danuri call center).*

#### **Passion Payment: Working with Unlimited Service Mind to the Clients**

It was found that role and responsibility of the counseling professionals were mainly recognized as the interpreters and counselors by themselves. Therefore, they are dissatisfied on the treatment as such although they play roles of the specialists. These perceptions are revealed to be different from those of center heads or middle managers.

In case of the center heads, they perceived the civil appealing occurred due to the insufficient capability or competency as the interpreters or counselors causing excessive workload to the other Korean employees who were in charge of the other works. In conclusion, they perceived their works at the site were driven by their passion to resolve the urgency on the grief, fear, and help in the foreign country that they also experienced, rather than the appropriateness of the compensation system.

These results showed the difference of the perception between the actual counseling staff members and the center heads or middle managers, suggesting them to be affected to the organization culture and loyalty in the center negatively.

*First with respect to the qualification as the interpreter, some complained us that the interpretation was not good. So I talked to a Korean counselor that controlling interpreters well was also her responsibility. Secondly, I said it should be acknowledged that this was the best service among the free public services with this kind of salary level (Manager 1, Danuri call center).*

#### **IV. CONCLUSION**

First, the recognition on the function of call center by the employees were to support the married immigrants and the whole immigrant women, and they perceived that emergency support and the life settlement support were strengthened after the integration of the call center.

Second, the required professional competencies to the employees were the basic counseling skill, professional capabilities, the capacity to intervene to the crisis, and career development for the dedicated personnel.

Third, the perception on the service performance evaluation of the employees revealed that there was no special treat to the experienced employees, they experienced the stress due to multiple roles, and also experienced the isolation and anger on the fact that they were isolated from the legal supports although they worked for the isolated people. In addition, they perceived strengthening competency and healing of the dedicated personnel should be on them by themselves. They were working with the identities of the specialists while the treat did not meet the expectation.

Based on these results, it is suggested that the employees in the call center require the support of competency strengthening programs to improve their professional knowledge and the skills.

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## Changes of Higher-Order Aberrations According to the Increase of Refractive Errors

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### Abstract---

**Background/Objectives:** To identify the relationship between spherical refractive errors and higher-order aberrations and the relationship between cylindrical refractive errors and higher-order aberrations, the higher-order aberrations within 6mm zone were measured.

**Methods/Statistical Analysis:** The refractive errors and higher-order aberrations were measured by KR-9000PW (Topcon Corp., Japan), a wave front aberrometer using Hartmann-Shack method, and the aberrations within the 6mm range of pupil diameter were measured. The Zernike coefficients from 3<sup>rd</sup> to 4<sup>th</sup> expressions were analyzed.

**Findings:** All higher-order aberrations such as trefoil aberration, coma aberration, tetrafoil aberration, 2<sup>nd</sup> astigmatism, and spherical aberration that were analyzed showed a significant correlation with cylindrical refractive error. On the other hand, only spherical aberration had a correlation with the spherical refractive error in the comparison between higher-order aberrations and spherical refractive error, and the remaining aberrations had no significant correlation. In the comparison with Zernike coefficients, Z40, Z42, and Z44 had a significant correlation with the Spherical refractive error and cylindrical refractive error, while Z31 had a significant correlation only with the spherical refractive error. The other coefficients had no significant correlation with both spherical refractive error and cylindrical refractive error.

**Improvements/Applications:** Since higher-order aberrations have very small values compared to refractive error and the values change greatly in each measurement, it is considered necessary to measure higher-order aberrations more precisely to identify the correlations among each other.

**Keywords---** Spherical Refractive Error, Higher-Order Aberration, Cylindrical Refractive Error, Zernike Coefficients, Wave front aberrometer.

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## I. INTRODUCTION

Monochromatic aberrations, which become the main optical cause to see objects clearly, can be classified into lower-order aberrations and higher-order aberrations. They can be corrected by glasses or contact lens because they are lower-order aberrations that mean simple refractive errors such as defocus and astigmatism, and higher-order aberrations cannot be corrected. The higher-order aberrations of eyes are less compared to lower-order aberrations, but have been the subject of attention with regard to the qualitative part of image formed on the retina<sup>1-3</sup>.

Higher-order aberrations requires to be measured precisely because it have small values. Even if the same objet is measured by the same aberrometer, it has been reported that values vary depending on conditions such as tear membrane or the arrangement of visual axis at the time of measurement<sup>4-6</sup>. The precision of aberrometers that have been developed and commercialized in the market has been verified through experiments such as artificial eyeholes, there are still various reports of clinical results<sup>7-12</sup>.

With the development of wave front aberrometer, there have been overseas researches conducted on the correlation between the refractive error and higher-order aberrations. While most researches report that higher-order aberrations increase as the refractive error increases, studies show differences regarding statistical significant correlations<sup>13-15</sup>.

Cheng et al<sup>14</sup> argued that severe myopia increases spherical aberration, but Chun et al<sup>16</sup> said that the increase of SE(spherical equivalent refractive error) does not results in the significant change of spherical aberration and coma aberration. In contrast, Faridet al<sup>13</sup> claimed in their study that spherical aberration and coma aberration have a significant correlation with SE, and that cylindrical refractive error has correlations with total higher-order aberration, 4<sup>th</sup> aberration, coma aberration, etc.

This study sought to examine not only the correlation of the refractive errors of eyes with individual higher-order aberrations but also the correlation with each of Zernike coefficients and refractive errors.

## II. METHOD

The study subjects were 198 university students who had never received an eye surgery and had recently not worn contact lens for a certain period of time (6 weeks for hard lens and 2 weeks for soft lens). Their age ranged from 20 to 29 years old and the mean age was 23. The refractive errors and higher-order aberrations were measured by KR-9000PW (Topcon Corp., Japan), a wave front aberrometer using Hartmann-Shack method, and the aberrations within the 6mm range of pupil diameter were measured.

The Zernike coefficients from 3<sup>rd</sup> to 4<sup>th</sup> expressions were analyzed. Finally, the study analyzed the correlation between RMS value of each coefficient and refractive error as well as the correlation between refractive errors and each of aberrations, including trefoil, coma, tetra foil, 2nd astigmatism, and spherical aberration. To measure the refractive errors of eyes used in the comparison, the spherical refractive error and cylindrical refractive error were used.

## III. RESULTS

The mean spherical refractive error of 198 subjects (396 eyes) was -2.34D and the mean cylindrical refractive error was -1.00D. The mean RMS of total higher-order aberration was 0.397  $\mu\text{m}$  and the aberrations of 3<sup>rd</sup> expression (Z3-3, Z33, Z3-1, and Z31) and the 4<sup>th</sup> expression (Z4-4, Z44, Z4-2, Z42, Z40) were 0.303  $\mu\text{m}$  and 0.199  $\mu\text{m}$  respectively.

The mean RMS of trefoil aberration (Z3-3, Z33) was measured to be 0.194  $\mu\text{m}$ , coma aberration (Z3-1, Z31) was 0.217  $\mu\text{m}$ , tetra foil aberration (Z4-4, Z44) was 0.086  $\mu\text{m}$ , 2<sup>nd</sup> astigmatism (Z4-2, Z42) was 0.083  $\mu\text{m}$ , and spherical aberration (Z40) was 0.106  $\mu\text{m}$ .(Table 1)

Table 1: Mean RMS( $\mu\text{m}$ ) of Ocular Higher-Order Aberrations for 6mm pupil zone; Trefoil(Z3-3, Z33), Coma(Z3-1, Z31), Tetrafoil(Z4-4, Z44), 2nd Astigmatism(Z4-2, Z42), Spherical(Z40)

Aberration	Mean( $\pm$ SD)	Range
Total HOA	0.397( $\pm$ 0.192)	0.120~1.995
Third	0.303( $\pm$ 0.163)	0.035~1.336
Fourth	0.199( $\pm$ 0.113)	0.022~0.867
Trefoil	0.194( $\pm$ 0.110)	0.013~0.646
Coma	0.217( $\pm$ 0.145)	0.002~1.179
Tetrafoil	0.086( $\pm$ 0.078)	0.004~0.545
2nd Astigmatism	0.083( $\pm$ 0.066)	0.002~0.550
Spherical	0.106( $\pm$ 0.129)	0.003~0.610

Pearson correlation analysis was carried out to figure out the correlation between spherical refractive error and the RMS of higher-order aberration. Only the spherical aberration had a significant correlation with the spherical refractive error ( $r=0.115$ ,  $p<0.05$ ) and the other aberrations had no significant correlations with the spherical refractive error. In the comparison between each of Zernike coefficients and spherical refractive error, Z31, Z40, Z42, and Z44 had a correlation with the spherical refractive error with correlation but the other Zernike coefficients appeared to have no significant correlations with the spherical refractive error.(Figure 1-4)

According to the comparison between cylindrical refractive error with higher-order aberration, all aberrations such as trefoil, coma, tetra foil, 2nd astigmatism, and spherical aberration showed a significant correlation with cylindrical refractive error. However, among Zernike coefficients, only Z40, Z42, and Z44 had a correlation with the cylindrical refractive error but the other coefficient had no significant correlation. (Figure 5-11)

In the comparison of SE and higher-order aberration, only the spherical aberration had a significant correlation as in spherical refractive error and other aberrations did not have significant correlations with SE. In the comparison of SE and Zernike coefficients, Z31, Z40, and Z42 had significant correlations. (Figure 12-14)

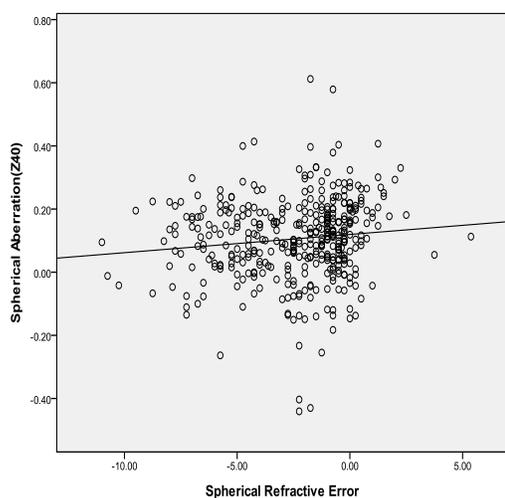


Figure 1: Correlation Between Spherical Refractive Error and Spherical Aberration Z40. ( $r=0.115$ ,  $p=0.02$ )

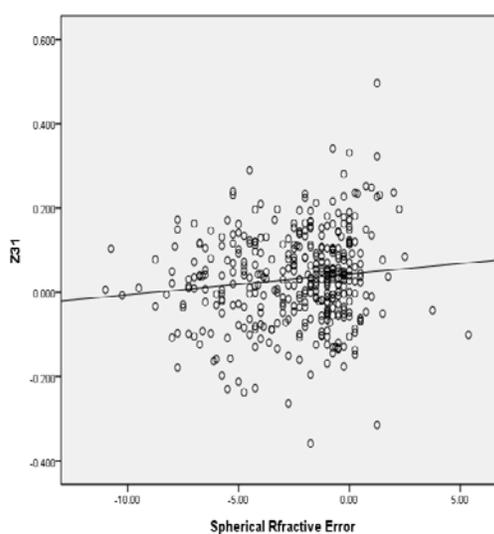


Figure 2: Correlation Between Spherical Refractive Error and Z31. ( $r=0.117$ ,  $p=0.02$ )

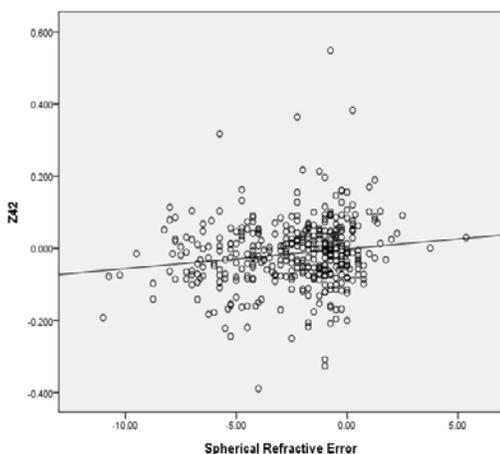


Figure 3: Correlation Between Spherical Refractive Error and Z42. ( $r=0.149$ ,  $p=0.00$ )

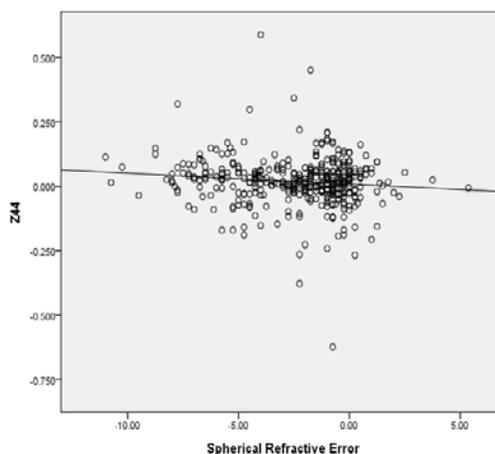


Figure 4: Correlation between Spherical Refractive Error and Z44. ( $r=-0.114$ ,  $p=0.00$ )

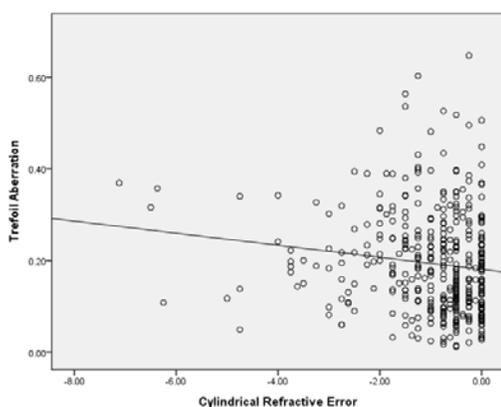


Figure 5: Correlation between Cylindrical Refractive error and Trefoil Aberration. ( $r=-0.131$ ,  $p=0.01$ )

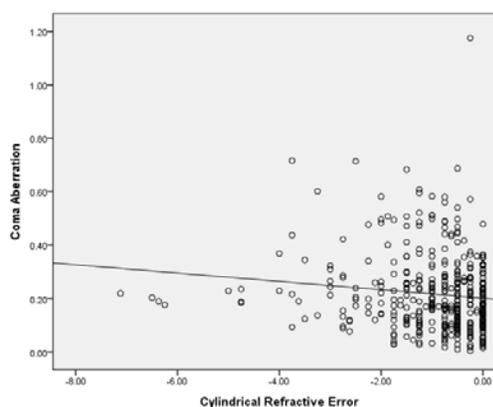


Figure 6: Correlation between Cylindrical Refractive Error and Coma Aberration. ( $r=-0.118$ ,  $p=0.02$ )

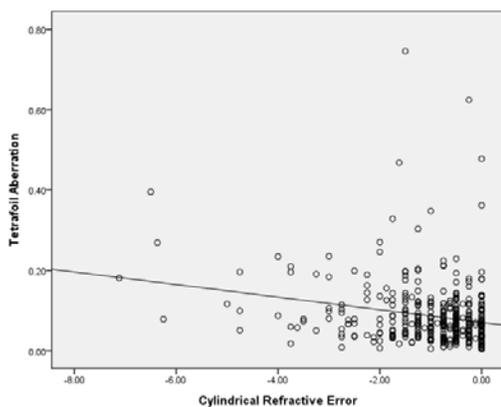


Figure 7: Correlation Between Cylindrical Refractive Error And Tetrafoil Aberration. ( $R=-0.221$ ,  $P=0.00$ )

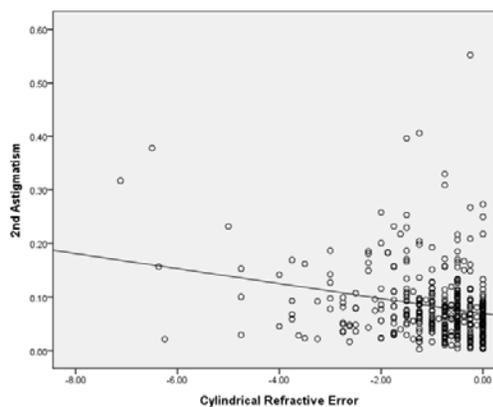


Figure 8: Correlation between Cylindrical Refractive Error and 2nd Astigmatism. ( $r=-0.233$ ,  $p=0.00$ )

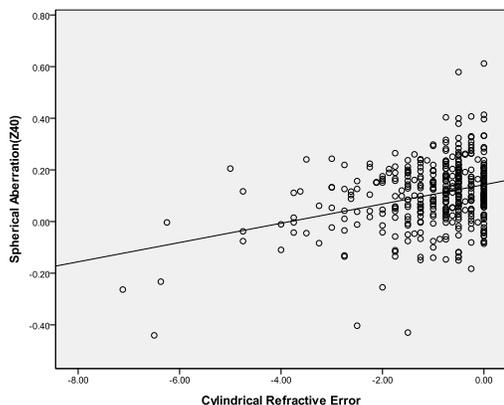


Figure 9: Correlation between Cylindrical Refractive Error and Spherical Aberration Z40. (r=0.319, p=0.00)

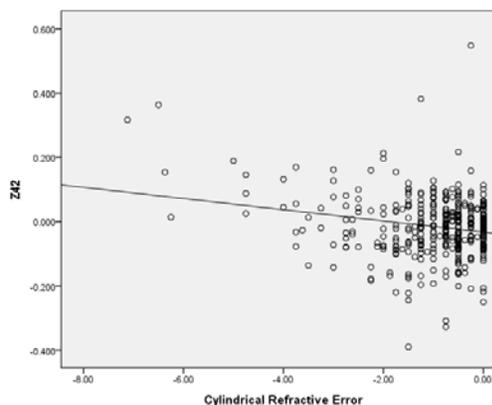


Figure 10: Correlation between Cylindrical Refractive Error and Z42. (r=-0.202, p=0.00)

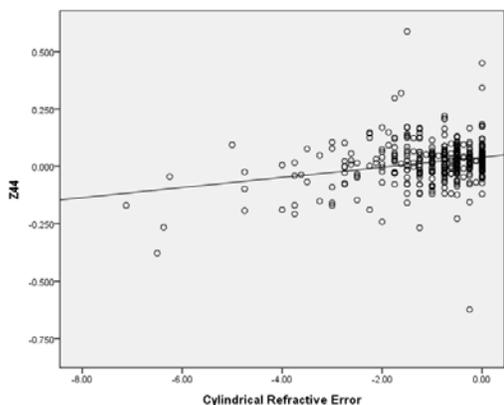


Figure 11: Correlation between Cylindrical Refractive Error and Z44. (r=0.256, p=0.00)

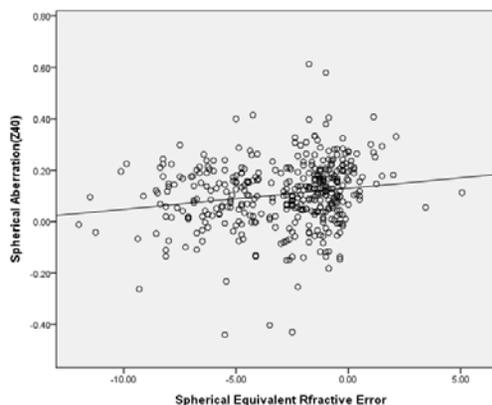


Figure 12: Correlation between Spherical Equivalent Refractive Error and Spherical Aberration Z40. (r=0.172, p=0.00)

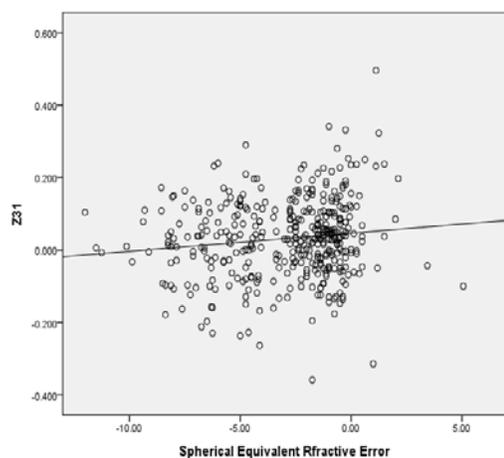


Figure 13: Correlation between Spherical Equivalent Refractive Error and Z31. (r=0.126, p=0.01)

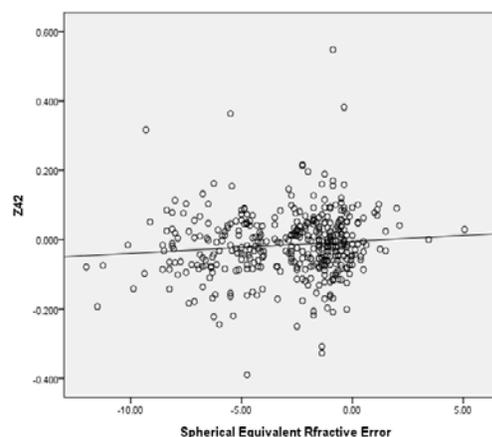


Figure 14: Correlation between Spherical Equivalent Refractive Error and Z42. (r=0.099, p=0.04)

#### IV. CONCLUSION

Cylindrical refractive error had significant correlations with all higher-order aberrations such as trefoil aberration(Z3-3, Z33), coma aberration(Z3-1, Z31), tetra foil aberration(Z4-4,Z44), 2<sup>nd</sup>astigmatism(Z4-2, Z42), and spherical aberration(Z40). On the other hand, spherical refractive error and SE had no significant correlations with all higher-order aberrations except spherical aberration(Z40).

In the comparison of Zernike coefficients, spherical refractive error had significant correlations with Z31, Z40, Z42, and Z44, and cylindrical refractive error had significant correlations with Z40, Z42, and Z44. Spherical equivalent refractive error (SE) had significant correlations with Z31, Z40, and Z42.

These results showed that Z40, a spherical aberration, and Z42, the 2<sup>nd</sup> astigmatism (45°), had correlations with all refractive errors that were categorized. Other higher-order aberrations had weak correlations with refractive errors. Since higher-order aberrations have very small values compared to refractive error and the values change greatly in each measurement, it is considered necessary to measure higher-order aberrations more precisely to identify the correlations among each other.

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## Factor Analysis of Influencing National R&D Performance-Focusing on the Characteristics of National R&D Programs of Gerontechnology

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### Abstract---

**Objectives:** The interaction between population aging and technology development implies ways to solve fundamental problems caused by aging society. Therefore, this paper studies on examining factors influencing gerontechnology related national R&D projects.

**Methods/Statistical Analysis:** The logistic regression model was used to examine the hypotheses of factors influencing national R&D performances. The data of 374 cases of national R&D projects of gerontechnology, performed between 2011 and 2015 was acquired from NTIS(National Science & Technology Information Service). Because gerontechnology is not categorized as one of technology domains in NTIS, this paper selected keywords such as elder or aging to retrieve data.

**Findings:** The result of the analysis shows that there is significant difference among factors influencing national R&D projects. While the term or investment of research showed positive relationship with both types of the performance, there was difference of performance among types of research organization. However, the convergence research did not have significant difference in influencing the performance. It implies what needs to be improved during the process of constructing plans of national R&D programs to enhance the efficiency of the programs in the field of GT. Based on the research and the results, we suggest academic and policy implications.

**Improvements/Applications:** To examine factors influencing R&D performance in more detailed, the quality of the performance also needs to be considered. Moreover, additional factors need to be included to reflect the aspects of GT.

**Keywords---** Gerontechnology, National R&D, Aging, Characteristics of R&D Programs, Korean NTIS, R&D Performance.

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## I. INTRODUCTION

Due to decrease in birth rate and increase in life expectancy, the number of elders in the world is increasing. Also in Korea, 'compressional aging' has been occurring, which results the various economic or societal problems<sup>1,2,3</sup>, yet, the country is not fully prepared to encounter into aged society.

Korea was categorized as aging society relatively to other developed countries; however, the period of entering to the super-aged society is much shorter. It is estimated that it would take 26 years for Korea to enter super-aged society from aging society, while France takes 155 years, the US 88 years, and Japan 36 years<sup>3</sup>. The rapid increase in population of elders in Korea is decreasing potential growth rate of economy, causing conflicts among generation or discouraging the elders to participate as a member of social citizens<sup>2,5,6</sup>. Aging negatively affects various fields, which implies that current viewpoint of assisting or supporting elders has limits to solve fundamental problems.

To overcome such limitations, studies utilizing science and technology(ST) are becoming important. In the past, the development of ST was mainly for national economic growth, but recently, it is focusing on improving welfare or solving societal issues, including aging<sup>4</sup>. The developed countries are nationally endeavoring to vitalize ST in order to correspond to the aging. Not only are they trying to find ways to practically support the elders, but also to gain national competitiveness in upcoming industries for changing needs of elders due to the change of population.

On the other hand, in Korea, there is lack of studies or researches on roles or definitions of ST integrating with aging. There were studies on examining ways for ST to be used for social welfare, including assisting the elder; however, there are insufficient studies on utilizations of ST, designated only to aging. Especially, there are few researches of empirical analysis on national R&D programs dealing with subjects related to the aging. Analysis on the R&D programs is necessary to provide meaningful policy implications caused by aging, as one of the programs' roles is to seek ways and prepare to overcome problems expected to occur in the future<sup>7</sup>.

Therefore, this paper conducts empirical analysis on national R&D programs in the field of gerontechnology(GT) to examine factors influencing the R&D performance to suggest implication of planning and managing R&D. The data is retrieved from NTIS(National Science & Technology Information Service), and the study consists of 374 national R&D projects conducted during 2011-2015.

## II. RELEVANT RESEARCH

### A. Gerontechnology(GT)

GT, a compound word of gerontology and technology, was first introduced by J. Graafmaans in 1989 in order to suggest new domain of technology that is specialized at fulfilling the needs of the elders including psychological or social issues as well as physiological or medical issues<sup>8,9</sup>. One of the earliest definitions of GT was coined by H. Bouma in 1992. He tried to integrate ST development with aging which both rapidly occurred in 20<sup>th</sup> century and defined GT as the study of technology along with aging to improve daily functioning of the elders<sup>9,10,11</sup>. Later, he defined GT as the study on interaction of technology and demography, the increase of elderly population, in order to embody the role of technology to improve the life of the elders and to encourage their participation as a social member<sup>10</sup>. He viewed that the technology should not only support or assist physical function but also facilitate the elders to participate fully as a citizen of their societies. <sup>11</sup> and <sup>12</sup> expanded the recipients of GT. They defined GT as technology domain that concerns improvement of physical functioning or quality of life for aging and aged adults. By including the term of 'aging adults', they tried not to restrict recipients of particular age group. The definition meets the initial goals of GT suggested by <sup>13</sup> in the early period, which include preventing or delaying declines in functioning due to aging as well as compensating the functioning or enhancing the social activities.

In Korea, there is lack of theoretic or academic studies on the field of ST that focuses on aging. Some uses the term of 'welfare ST'. The term welfare is used to describe both elders and disabled. Therefore, in this paper, to focus on ST for aging, we define GT as technology domain of national R&D program that has the purpose of fulfilling the needs of aging and aged adults by providing technologically based products as well as environment or services.

Previous technology domain such as assistive technology or medical technology could not sufficiently reflect the different needs of the aging population<sup>14</sup>. Therefore, when GT was introduced, there are several

aspects. First, GT concerns user-friendly innovation<sup>10,12,13,15</sup>. The innovative development was only about the technological difference or higher-level of technology. However, as the capacity of adopting new technology declines as people get older, GT's goal is to develop innovative products to allow more aging people to enjoy the development of technology. Second, GT is the study based on multidisciplinary research<sup>11,14,16</sup>. The research needs multidisciplinary approach as GT was first introduced based on interaction of gerontology and technology due to lack of previously existing technology domain. <sup>11</sup> even argued that GT does not have its own scientific theory or methodology and its theoretical base is from cross-fertilization of gerontology and technology. Third, GT should not rely on a particular R&D stage, rather it should meld basic research with applied or development research<sup>9,13</sup>. The technology domain needs to study on the process or phenomenon of aging and the usage of technology along with attempt to implement or adapt existing or developing technology to produce or design more usable products.

### **B. The Factors Influencing National R&D Performance**

National R&D performance can be categorized into two. The first performance is output, consisting papers, patents, or products, created directly from R&D activities. The second performance is outcome and impact, which are the result of transferring the first performance<sup>17,18</sup>.

As Korean government has continuously increased the amount of investment on national R&D programs, many researchers conducted researches to examine factors enhancing the efficiency of the R&D performance<sup>17,19</sup>. <sup>20</sup> analyzed a large scale government R&D program to examine how factors influence on different R&D outputs. The result showed that there was significant difference in papers or patents applied in foreign countries according to R&D performers. Also, the R&D stage showed significant relationship with patents applied in domestic or technology transfer.

<sup>18</sup> analyzed 92,128 projects conducted between 2006 and 2009 with government subsidy. They studied the relationship between R&D performance and cooperative factors. Based on the statistic results, the number of cooperative institutes had positive(+) relationship with papers and patents, while showed negative relationship with the technology transfer. <sup>21</sup> conducted analysis of 121 governmental R&D programs conducted between 2004 and 2006 in order to study on the efficiency of the programs. They showed that the R&D program tends to perform more efficiently when the proportion of investment on basic research increases.

There were also researches analyzing the factors that cause different influence on R&D performance based on the characteristics of technology. Choi and Kang<sup>17</sup> conducted analysis on 453 national R&D programs in the field of machinery and chemical technology. They argued the need of analyzing the R&D performance with the consideration of aspects of technology of industry in order to establish technology policy to have technology innovation. According to the result, there were different factors influencing the performance in accordance with technology domain. The government subsidy showed statistically positive relationship with the number of published SCI in chemistry industry, while it showed positive relationship with the number of published SCI and patents applied in domestic in machinery industry.

Shim and Kim<sup>22</sup> conducted diversified analysis of 121 national R&D programs executed between 2002 and 2008 to examine the correlation between investment and performance. According to the result, even with the same input, government subsidy, the output was significantly different among industries. While the subsidy did not influence on the output in electric industry, it showed significantly positive relationship with the output in aquaculture technology.

As shown above, depending on the subject of the analysis factors that influence national R&D performance can vary. Therefore, as this paper aims to suggest how to plan or manage national R&D programs to enhance the efficiency of R&D performance in GT, this paper selected factors demonstrating the R&D management as well as aspects of GT.

## **III. ANALYSIS METHODOLOGY**

### **A. Research Framework**

Based on the preceding researches, we constructed research framework as shown in Figure 1.

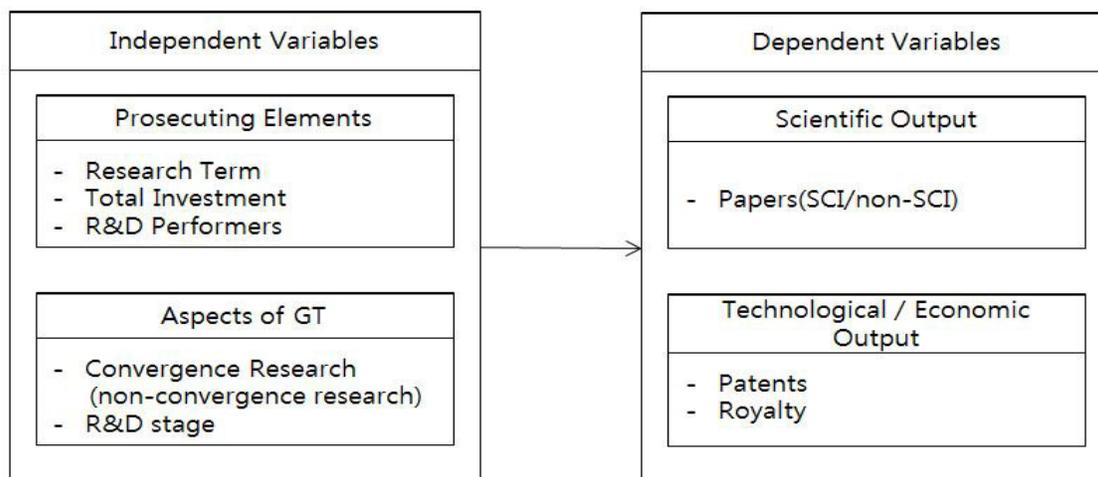


Figure 1: Research Framework

In independent variables, there are 5 variables indicating prosecuting elements and aspects of GT. As the factors of prosecuting elements, research term, total investment, and R&D performers were used<sup>23</sup>, while convergence research and R&D stage were selected as aspects of GT as mentioned above. In dependent variable, we divided the 1<sup>st</sup> performance, output, into two parts, scientific output and technological/economic output. In the scientific output, the number of papers published was used, and in the other output, the number of patents or cases of royalty was used.

### B. Data and Research Method

The data was retrieved from internal NTIS DB, and it consists of 374 R&D projects in the field of GT, conducted between 2011-2015.

As GT is not categorized in NTIS, we retrieved the projects by using keywords that is related to the definitions or roles of GT. The keywords are aging, elders, old, senior, and silver.

To examine which factors have statistical relationship with the possibility of creating each output from national R&D projects, this paper conducts logistic regression analysis.

We used the logistic regression analysis to inspect what factors would enhance the efficiency of creating outputs which are the resources to be utilized to improve the products, to reduce the cost, or to increase the sales.

### C. Variables

As independent variables, research term, total investment, R&D performers, convergence research, and R&D stage were used, while two of outputs, scientific output or technological/economic output, were used as dependent variables.

The definition of the variables is shown in Table 1.

As dependent variables, we divided the output into two to reflect the characteristics of output. Publishing papers improve the scientific knowledge.

On the other hand, creating patents and technology transfer each provides technological and economic values, which both show financial value.

As independent variables, reflect prosecuting elements or aspects of GT were selected The variable of Term is a dummy variable to identify the difference in effect between whether the research is short-term research or not.

According to regulation of R&D management, if the period of a research is 2 years or less, it is categorized as short-term research.

The term of convergence includes inter-disciplinary and intra-disciplinary on the basis of 2<sup>nd</sup> level category of technology in NTIS<sup>25</sup>.

Table 1: Definition of Variables

Category		Variables	Description
Dependent Variables		Output_science	Whether scientific output has been produced
		Output_tech/econ	Whether technological or economic output has been produced
Independent Variables	Prosecuting elements	Term	The period of research is - ~24: is less than 2 years - 24~: is longer than 2 years
		Inv	The total amount of investment
		Perf	The research performer is - Univ: university - Bus: business - Res: public research institute - other: other performers that do not belong to the other three categories
	Aspects of GT	Conv	The research can be categorized as - conv: convergence research - n-conv: non-convergence research
		Stage	The R&D stage can be categorized into - bas: basic research - app: applied research - dev: development research - other: other activities that do not belong to the other three categories

#### IV. EMPIRICAL RESULTS

As mentioned above, this paper aims to examine factors that can spur national R&D output by using empirical analysis. To have more detailed result, this paper divided the output into two, scientific output and technological or economic output. First, we analyzed descriptive statistics. Then we conducted logistic regression analysis using each output as a dependent variable.

##### A. Descriptive Statistics

Table 2 demonstrates descriptive statistics of variables. For the last five years(2011-2015), 374 national R&D projects in the field of GT were conducted. Research performers and R&D stage is categorized according to Ministry of Science, ICT and Future Planning(MSIP), and other elements in Perf and Stage were not considered as analysis variables as MSIP did.<sup>26</sup>

Table 2: Descriptive Statistic

Category	Variables	Frequency	Mean	SD	Min	Max	
Dependent Variables	Output_science	Produced	374	0.489	0.501	0	1
		Not produced					
	Output_tech/econ	Produced	374	0.174	0.379	0	1
		Not produced					
Independent Variables	Term	~24(0)	322	0.139	0.346	0	1
		24~(1)					
	Inv	(100mil:KRW)	374	1.376	3.642	0.05	61.775
	Perf	Univ(1)	265	1.201	0.617	0	3
		Bus(2)	68				
		Res(3)	16				
	Conv	conv(1)	25	0.067	0.250	0	1
		n-conv(0)	349				
	Stage	bas(0)	132	1.455	1.224	0	3
		app(1)	41				
dev(2)		100					

**B. Scientific Output**

First, we conducted Hosmer & Lemeshow test to examine goodness of fit. The test observes the correspondence between dependent variable and predicted value of the model, so if its p-value is bigger than 0.05, it means that the difference between them is small enough to say that the model is appropriate<sup>24</sup>. The test showed that the p-value is 0.970, meaning that the model is statistically acceptable. To examine how the factors describe the dependent variable, we used McFadden R<sup>2</sup>, which was 0.278. It means that the independent variables Table 3 shows the result of logistic regression analysis to examine factors influencing scientific output.

According to the test, all variables except Conv showed statistical significance. The possibility of creating scientific output did not show statistical significance with the aspect of research, whether it was convergence research or not. However, short-term researches create 2.694 times less possibility than mid-term or long-term researches. The lower possibility of creating the output in short-term researches implies that studies need to be conducted in a long term as the field of GT has been recently introduced. Also, when an investment increases ₩100 million more, the possibility of creating scientific output increases 1.394 times more. The result indicates that it is more efficient to choose limited number of R&D projects so that sufficient amount of investment can be provided to each project than to allow many R&D projects conducted with small amount of capital. When comparing among research performers, public research institutes showed higher possibility of creating the output than other performers. The result implies that the traditional role of the institutes in Korea, supporting private sectors to raise competitiveness in a new industry can be feasible in the field of GT. Also, applied research has higher possibility of creating the output than basic research, while development research shows lower possibility. The result corresponds with the aspect of GT, melding existing technology or research for better products<sup>9</sup>.

Table 3: The Result of Logistic Regression Analysis of Scientific Output

Variables		B	Exp(B)	S.E.	Wald	p-value
Term		0.991	2.694	0.454	4.761	0.028*
Inv		0.332	1.394	0.100	10.972	0.010*
Perf	Univ	1.712	5.540	0.554	8.316	0.000***
	Bus	-0.230	0.795	0.723		
	Res	2.487	12.025	0.856		
Conv		-0.076	0.927	0.528	0.021	0.885
Stage	app	0.333	1.395	0.405	3.736	0.011*
	dev	-0.938	0.391	0.381		
***<0.001, **<0.01, *<0.05 McFadden R <sup>2</sup> = 0.278						

**C. Technological or Economic Output**

The Hosmer & Lemeshow test of the model showed that it is statistically acceptable as the p-value was 0.882, meaning that the model using technological or economic output as a dependent variable is also acceptable. The McFadden R<sup>2</sup> showed 0.584.

As shown in Table 4, like the result of analysis of scientific output, the variable of Conv did not show statistically significant difference. It means that the national R&D projects in the field of GT did not make significant effort when conducting multidisciplinary research. However, the other variables showed significant difference.

Mid-term or long-term researches showed 5.355 times higher possibility of creating the technological or economic output than short-term researches. The possibility of creating the output also increased when increasing the amount of investment. When an investment increases ₩100 million more, the possibility increases 1.256 times more. Unlike the scientific output, technological or economic outputs are created with higher possibility in business than any other performers. This indicates that a business is more interested in creating financial value from R&D than other sectors. Moreover, development research showed higher possibility of the creation than any other stages.

Table 4: The result of logistic regression analysis of technological or economic output

Variables		B	Exp(B)	S.E.	Wald	p-value
Term		1.678	5.355	0.592	8.024	0.005**
Inv		0.228	1.256	0.097	5.555	0.019*
Perf	Univ	0.033	1.034	0.939	5.526	0.001**
	Bus	2.058	7.830	0.965		
	Res	0.692	1.998	1.169		
Conv		-1.291	0.275	0.883	2.138	0.145
Stage	app	0.508	1.662	0.668	3.680	0.012*
	dev	1.877	6.534	0.572		
***<0.001, **<0.01, *<0.05 McFadden R <sup>2</sup> = 0.584						

#### D. Summary of the Analysis and Implication

This paper used logistic regression model to conduct empirical analysis of factors influencing output created from national R&D projects in the field of GT. To provide detailed information, we divided the output into two, and the test results show that how the factors influenced on each output. Based on the results, this paper suggests policy or academic implications.

First, there was no significant difference in both outputs by the aspect of multidisciplinary. The convergence researches did not show significant difference in creating the outputs with non-convergence researches. The necessary of convergence research was the reason why GT was introduced as existing technology could not fundamentally solve the problems occurred due to aging. Therefore, when considering the core aspect of GT, further study needs to be done to inspect ways to enhance the efficiency of convergence researches.

Second, the period of research and the amount of investment showed positive relationship with the outputs. This denotes that in the process of planning national R&D management, it is more recommendable to choose reasonable number of R&D projects and allow them to conduct research with sufficient amount of time and budget. There is a need of in-depth studies on GT as it has been recently introduced, and academic theory has not been established yet. Also, another viewpoint is necessary to promote the elder to utilize the developing innovative technology. Therefore, to fulfill the changing needs and to pioneer the new technological field, sufficient amount of time and capital needs to be invested to the R&D projects in GT.

Third, the variables of Perf and Stage showed different influence in accordance with the type of output, meaning that elements of input variables need to be considered according to the purpose of the R&D. When considering the role of the institutes as mentioned previously, we assume that they are more interested in creating scientific output in GT. On the other hand, business is more interested in making profit, which leads them to invest more on R&D which can provide financial values. Therefore, universities and the public research institutes should more focus on basic research or applied research to provide scientific knowledge, while business focusing on development research to provide products with financial value.

#### V. CONCLUSION

This paper suggests meaningful implications to better manage R&D projects specifically targeting the field of GT. The rapid increased proportion of elder population requires the government to prepare for the problems that are planning to be occurred in the close future. The increase of elder population does not simply denote the change of demography; rather it requires financial and social support system to allow them to fully play a role as a member of citizens. To attain the goal, the development of ST of which the purpose is inclusive innovation is necessary.

However, yet in Korea, there is lack of study on examining ways for ST to focus on aging. Therefore, this paper aimed to verify factors to enhance the performance by using empirical analysis. We retrieved national R&D projects in the field of GT and observed factors influencing on the projects to enhance the efficiency of the R&D performance. The independent variables were selected considering prosecuting elements and aspects of GT, and we conducted logistic regression analysis to examine factors that influence on output that is directly created from R&D activities. This paper suggests academic and policy implication because

empirical analysis on national R&D projects has not been conducted enough and the new term of GT was introduced and applied to specify the projects on aging.

According to the empirical analysis, the term and the amount of investment showed statistically positive relationship with both outputs, scientific output and technological or economic output, while whether the convergence research was conducted or not had no statistical difference in the outputs. However, there were factors that influence differently on the possibility of creating outputs. The possibility of creating scientific output was higher in advanced research and the public research institutes, while the possibility of creating technological and economic output was higher in development research and business. Based on the results, we came up with the implication as follows. First, more studies are needed to enhance the efficiency of convergence research. Second, basically, sufficient amount of time and investment is needed to spur the output from R&D projects, and some other factors needs to be differently selected based on the purpose or aspects of the R&D.

The limit of the paper is that first, the quality of output is not measured. Second, more variables that show the aspects of GT need to be included. Therefore, further studies needs to be conducted considering the quality of output and aspects of the technology.

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## A Study on the User Behavior in Online Idea Plat Form by Regression and Principal Component Analysis

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### Abstract---

**Background/Objectives:** This study is aimed to suggest a weblog data-based user behavior analysis method. For this, the idea commercialization platform titled 'Online Creative Economy Town' which is operated as a part of national public policies, not a common website was targeted.

**Methods/Statistical Analysis:** For weblog analysis, both dimension and metrics provided by Google Analytics (hereinafter GA) were used. In particular, session and page view provide a lot of information because they are available as KPI. Therefore, it is able to get diverse insights through series regression and principal component analysis modeling.

**Findings:** First, the results obtained through total page view and variation by service for the past year differed from the series regression results. Therefore, they need to be analyzed and applied in accordance with necessary. In addition, the results from the principal component analysis confirmed that services are grouped by the factors differ than the actual user behavior pattern.

**Improvements/Applications:** First, a regression model was developed provided that session and page view are correlated with each other, not in a causal relationship with difference in a measurement technique only. Even though there was a limitation in analysis, it was able to get a clue how the page view by service should be managed as a means to increase session. In addition, it is anticipated that a user-oriented policy regarding service configuration and operation could be developed for principal component analysis on page view.

**Keywords---** Weblog, User Behavior, Google Analytics, R, Coefficient of Variance, Serial Regression, Principal Component Analysis.

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## **I. INTRODUCTION**

Recently, many countries around the world have attempted to shift their strategy from the imitation of advanced technologies to the technology innovation-oriented strategy to secure sustainable growth engine such as incubation of new industry market and job creation. A lot of advanced countries have already established a growth ground using science and technology for sustainable growth, improvement of innovation competency and job creation. They have also reorganized their system to spread people's creative ideas. In the past, small startup in which a person takes care of almost everything for business and startup was mostly popular. Today, in contrast, open innovation in which knowledge and technology from the outside are utilized through an idea-related platform is in the mainstream. Therefore, a space where anyone actively participates in innovation activities has drawn an attention. Furthermore, an online platform has the advantage of being easily approached by a user or consumer, and its strength is being more emphasized along with the development of hardware (mobile devices). The Online Creative Economy Town is an online idea commercialization platform (aka. idea support platform) promoted as a part of public policies for the valuation and commercialization of ideas and promotion of business startup. It's been operated by the Korea Institute of Science Technology Information(KISTI). Recently, the Online Creative Economy Town has been in the spotlight as a welfare-type, idea commercialization platform in that anyone can easily participate free of charge, revealing differentiated characteristics with the establishment of major processes. However, it has the weakness of not properly reflecting actual users' needs due to stiff and vertical decision-making process. In particular, the idea platform has become more interaction-oriented, not just support-centered so that there has been a strong demand for feedback-based operation. Therefore, this study attempts to investigate actual users' behavior and necessities by analyzing their weblog based on the features of the Online Platform. For this, empirical analysis was performed by applying the tool and methodology which are known efficient for weblog analysis. As a result, it is anticipated that a more advanced platform could be built through diverse analyses.

## **II. METHOD**

### **A. User Behavior Analysis**

GA has evolved into the standard of weblog analysis, as a powerful tool for measurement and analysis. Weblog analysis includes a domain in which diverse methodologies and data collection techniques are required. In this study, a statistical methodology was applied after using GA in the extraction and filtration of onsite weblog data and using 'R' in modeling. The use of onsite weblog data in analysis means that actual users' behavior is fully recorded. Then, the analysis results can be a feedback for website operation.

### **B. Statistical Modeling**

Even though user behavior is properly recorded using GA, the records would become useless unless the data are properly understood.

They would also be of no use if data were collected without setting a goal in the beginning. Google clearly describes the basic dimension and metric of a weblog, and they can be easily confirmed on online. In this study, users are measured through total visitors over time and page visits by service. Therefore, page view and session were set as the metric, taking data and page path as dimensions. Since GA is basically extracted as a longitudinal data form, it is converted into a cross-sectional data form in 'R.' Then, a linear model was applied. Because they were time series data, weekday-included serial regression and correlation matrix-based principal component analysis were performed.

## **III. ANALYSIS**

### **A. Explanatory Data Analysis(EDA)**

This study was performed for 12 months from October 1, 2015 to September 30, 2016. For this, the data which recorded a session used as total website visitors and page view total by service daily were used. According to (Table 1), average visitors per day were 3,400 persons, and idea contest service users were the largest.

According to page view-session correlations by service, the idea contest with the highest pageview was most correlated, but page view and correlation are not always proportional to each other. Therefore, it would be necessary to check the 1:1 relationship by a regression model, excluding other conditions.

Table 1: Summary of Basic

		Mean	Standard deviation	Correlation by session
session		3408.96	1557.01	1.00
Idea Playground	Fun idea	911.53	555.67	0.33
	creativity	858.22	1297.57	0.18
	startup news	147.41	110.16	0.27
	Science information	86.28	97.57	0.26
Idea Challenge	idea proposal	1061.14	819.63	0.18
	idea contest	2326.21	1805.04	0.67
	share	494.26	321.66	0.15
	problem contest	198.42	295.21	0.40
	My page mentor	649.87	341.67	0.34
	My page mentee	916.35	395.59	0.36
Business Information	intellectual property	134.38	157.41	0.09
	mentoring	101.84	97.14	0.04
	boast	218.22	178.16	0.25
	Online education	75.74	83.84	0.12
	information_mentor	45.42	34.51	0.11
	business calendar	207.72	151.82	0.37
	business program	186.31	170.20	0.05
	business organization	51.16	54.63	0.03
	Support event	95.99	68.78	0.08
	Support news	63.08	48.79	0.22
	inter-intellectual	546.66	421.43	0.21
	Customer Support	notice	764.86	651.82
FAQ		98.18	65.22	0.23
QNA		163.67	117.60	0.29
certification		22.03	19.74	0.04
Participation	activity	234.42	345.28	0.14
	introduce	183.38	286.05	-0.09
	Good idea	582.84	330.82	0.28
	story	124.51	81.26	0.23
	Press release	26.77	27.01	0.20
	sns	3.96	10.42	-0.05
	product	169.01	512.54	0.38

According to Coefficient of Variance (CV) which is used as useful statistical index, it is able to see what service is severe over time in terms of fluctuation (Figure 2). Clearly, summation as known as sufficient statistics shows a different form (Figure 1). The CV is calculated in the ratio of statistics as shown in Equation (1) below:

$$CV = \frac{\text{Standard deviation of } X}{\text{Mean of } X} \quad (1)$$

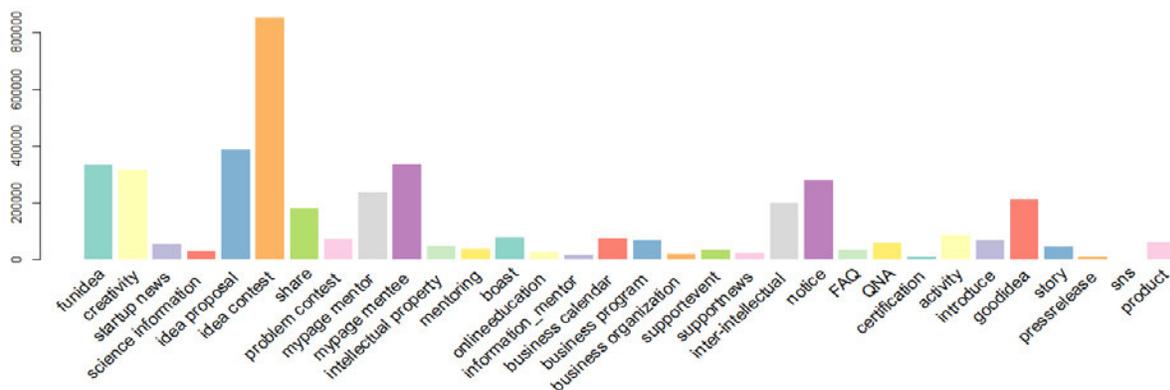


Figure 1: Bar Plot of Page View Sums

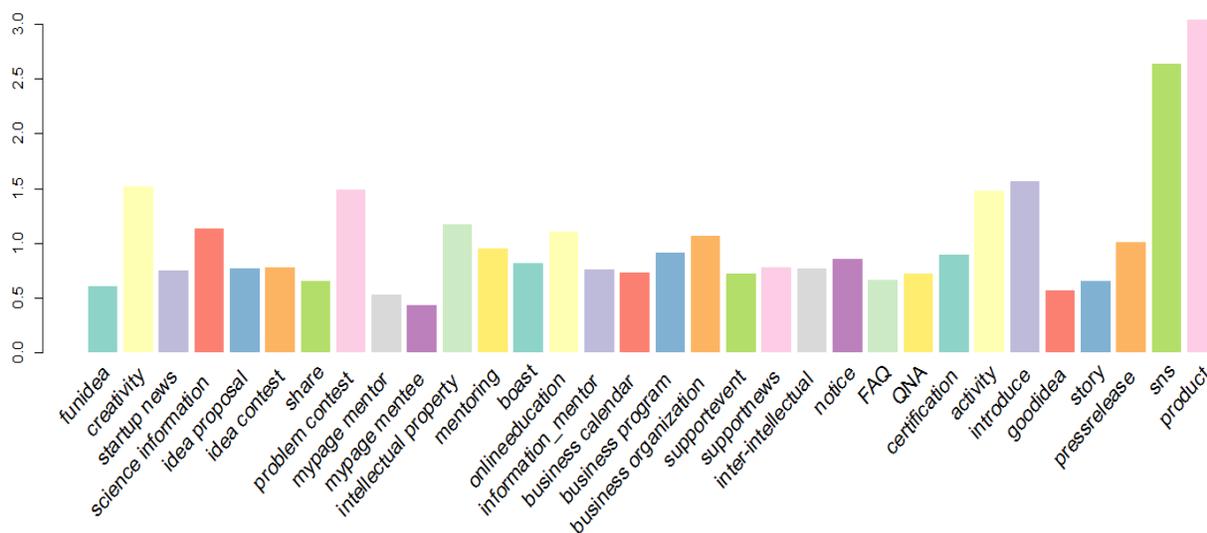


Figure 2: Bar Plot of Coefficient of Variance

### B. Serial Regression

To estimate relationship between a session used as a website visit index and page view in each service, series regression was developed. They are illustrated in Equation (2) below:

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \varepsilon_i \quad (2)$$

$\varepsilon_i \sim N(0, \sigma^2)$

$Y_i$ : session

$X_{ij}$ : pageview of each service

$i = 1, 2, \dots$ , days of 6 months

$j = 1, 2, \dots$ , numbers of service type

In this study were used daily observation data. Therefore, even though it is possible to make prediction through regression on time series data, it is hard to say that there is a direct causality, considering the measuring methods of both session and page view. Therefore, it is limited to relational inference only. The modeling results are stated in (Table 2). The R-squared is 0.813, and F-statistics is significant. Therefore, it is reasonable to say that the model is valid. As already confirmed with basic data, Monday was the highest while weekend was the lowest in terms of the number of visitors by day. In terms of coefficient by service, 'problem contest' and 'notice' were the highest with 0.77 and 0.71 respectively. Unlike correlations, they are estimated results. Therefore, there is an implication on the operational policy by service aimed to increase the number of visitors.

Table 2: Summary of Regression Model

		Estimate	sig	std.err	t	p
(Intercept)		960.12	***	140.47	6.84	<0.001
Weekday dummy (ref: Sunday)	Monday	582.38	**	181.72	3.21	0.001
	Tuesday	482.36	**	170.60	2.83	0.005
	Wednesday	387.58	*	167.65	2.31	0.021
	Thursday	437.33	**	164.06	2.67	0.008
	Friday	358.81	*	157.20	2.28	0.023
	Saturday	47.79		134.41	0.36	0.722
Idea Playground	funidea	0.32	*	0.15	2.21	0.028
	creativity	0.33	***	0.03	10.76	<0.001
	startup news	-0.21		0.59	-0.35	0.727
	scienceinformation	1.22	*	0.48	2.55	0.011
Idea Challenge	idea proposal	-0.22	**	0.09	-2.61	0.010
	idea contest	0.42	***	0.03	15.47	<0.001
	share	-0.38	.	0.20	-1.84	0.066
	problem contest	0.77	***	0.14	5.60	<0.001
	mypage mentor	-0.08		0.15	-0.53	0.598
	mypage mentee	-0.25		0.18	-1.39	0.165
Business Information	intellectual property	-0.37		0.49	-0.77	0.443
	mentoring	-2.36	.	1.42	-1.66	0.098
	boast	0.48	.	0.27	1.81	0.071
	onlineeducation	-0.63		0.89	-0.70	0.484
	information_mentor	1.56		2.61	0.60	0.550
	businesscalendar	-0.36		0.55	-0.65	0.515
	businessprogram	0.11		0.56	0.19	0.848
	businessorganization	-0.32		1.39	-0.23	0.816
	supportevent	-0.54		1.07	-0.51	0.614
	supportnews	3.74	**	1.44	2.60	0.010
Customer Support	inter-intellectual	-0.20		0.13	-1.55	0.123
	notice	0.71	***	0.08	8.94	<0.001
	FAQ	0.54		0.91	0.60	0.552
	QNA	0.90		0.56	1.59	0.113
Participation	certification	-6.24		5.04	-1.24	0.217
	activity	0.56	***	0.13	4.35	<0.001
	introduce	0.08		0.22	0.37	0.711
	goodidea	0.52	*	0.24	2.12	0.035
	story	0.01		0.60	0.01	0.992
	pressrelease	2.34		1.83	1.27	0.204
	sns	-15.44	*	7.27	-2.12	0.035
	product	0.93	***	0.07	12.46	<0.001
Adjusted R-squared : 0.813 F=42.77, df=(38,337), p<0.001 *** : <0.001, ** : <0.01, * : <0.05						

**C. Principal Component Analysis (PCA)**

The regression model mentioned above is meaningful in that it checked a relationship between session and page view by service. However, it is able to analyze services with page view only, without including session. Among the multivariate analysis methods which do not include causality, principal component analysis (hereinafter PCA) is commonly used as a dimension reduction method. As stated in (Table 1) above, services are classified into five factors by the operating entity in the data used in this study. If the PCA is used, however, it is able to find out what factor is used to group users' actual individual service usage patterns. The basic concept of PCA is to derive typical components by further abbreviating variables, making sure that the information of total variables is not lost. According to Equation (3) below, a total of 'p' variables (X) are shortened to 'k' components (Z). As shown in Equation (4), however, the components having the largest information (i.e., the greatest variation) are calculated in regular sequence, using a linear algebra technique.

$$Z_i = (Z_1, Z_2, \dots, Z_k)^T$$

$$X_i = (X_1, X_2, \dots, X_p)^T$$

$$p \geq k$$

X: pageview of each service  
Z: principal component

$$\text{Var}(Z_1) \geq \text{Var}(Z_2) \geq \dots \geq \text{Var}(Z_p) \tag{4}$$

$$\rightarrow \lambda_1 \geq \lambda_2 \geq \dots \geq \lambda_p$$

λ: eigen value

$$\sum_{i=1}^p \text{Var}(Z_i) = \sum_{i=1}^p \text{Var}(X_i) \tag{5}$$

$$\text{Cov}(Z_i, Z_j) = 0, i \neq j = 1, 2, \dots, p \tag{6}$$

In this study, a total of 32 services were used as variables, and the PCA results are stated in (Table 3). As confirmed in the EDA results above, a correlation matrix instead of a covariation matrix was used to apply a concept of standardization because of a high page view gap between services. Therefore, the standard of loading value was set to 0.2-0.3, not the standard level 0.8. As a result, 6 components explained 70.1% of total variation. In terms of service grouping, the components #1~ #6 could be named as Regular Contents(#1), Idea-Mentoring(#2), Basic Information(#3), Activate Contests(#4), Exhibition Contents(#5) and Event(#6) respectively.

Table 3: Component Loading Value of Eigen Vector

		comp1	comp2	comp3	comp4	comp5	comp6
Idea Playground	Fun idea	-0.230	-0.034	0.063	-0.039	0.084	-0.138
	creativity	-0.063	0.072	-0.009	-0.269	-0.262	-0.245
	startup news	-0.217	0.103	0.153	0.105	0.034	-0.139
	Science information	-0.090	0.221	0.124	-0.098	0.452	-0.140
Idea Challenge	idea proposal	-0.186	-0.283	-0.076	0.068	-0.072	-0.094
	idea contest	-0.069	-0.247	0.252	0.206	0.335	-0.097
	share	-0.219	-0.102	-0.104	-0.055	-0.005	-0.016
	problem contest	-0.050	-0.121	0.265	0.204	0.147	0.517
	My page mentor	-0.144	-0.310	0.122	0.010	-0.103	0.022
	My page mentee	-0.161	-0.342	0.110	0.045	-0.087	0.071
Business Information	intellectual property	-0.215	0.189	-0.015	0.226	0.002	0.049
	mentoring	-0.248	0.122	-0.151	0.119	-0.014	-0.022
	boast	-0.122	0.046	0.354	0.016	-0.160	0.018
	Online education	-0.208	0.239	0.055	0.117	0.025	0.076
	information_mentor	-0.246	0.050	-0.116	0.058	-0.004	-0.015
	Business calendar	-0.172	0.002	0.389	-0.124	-0.189	-0.153
	Business program	-0.134	-0.262	-0.414	-0.031	0.185	0.076
	Business organization	-0.227	0.140	-0.170	-0.004	-0.019	-0.039
	supportevent	-0.223	0.101	-0.093	-0.091	-0.044	0.138
	Support news	-0.207	0.105	0.201	-0.018	-0.158	-0.012
	inter-intellectual	-0.144	0.067	0.169	-0.497	-0.012	0.005
	Customer Support	notice	-0.157	-0.110	0.267	0.168	0.022
FAQ		-0.201	-0.159	-0.030	0.071	-0.050	-0.067
QNA		-0.192	-0.266	-0.047	-0.040	-0.017	-0.086
certification		-0.235	0.030	-0.224	0.053	0.015	0.006
Participation	activity	-0.084	-0.026	0.034	-0.508	0.019	0.461
	introduce	-0.173	0.199	-0.137	0.252	-0.089	-0.003
	Good idea	-0.199	-0.221	-0.114	-0.131	0.075	-0.085
	story	-0.152	-0.027	-0.079	-0.280	0.296	-0.122
	Press release	-0.131	0.170	-0.005	-0.011	0.333	0.388
	sns	-0.190	0.311	-0.009	0.020	-0.126	0.017
	product	0.049	0.060	0.149	-0.035	0.454	-0.363
Proportion of Variance		0.408	0.097	0.070	0.049	0.046	0.031
Cumulative Proportion		0.408	0.505	0.575	0.624	0.670	0.701

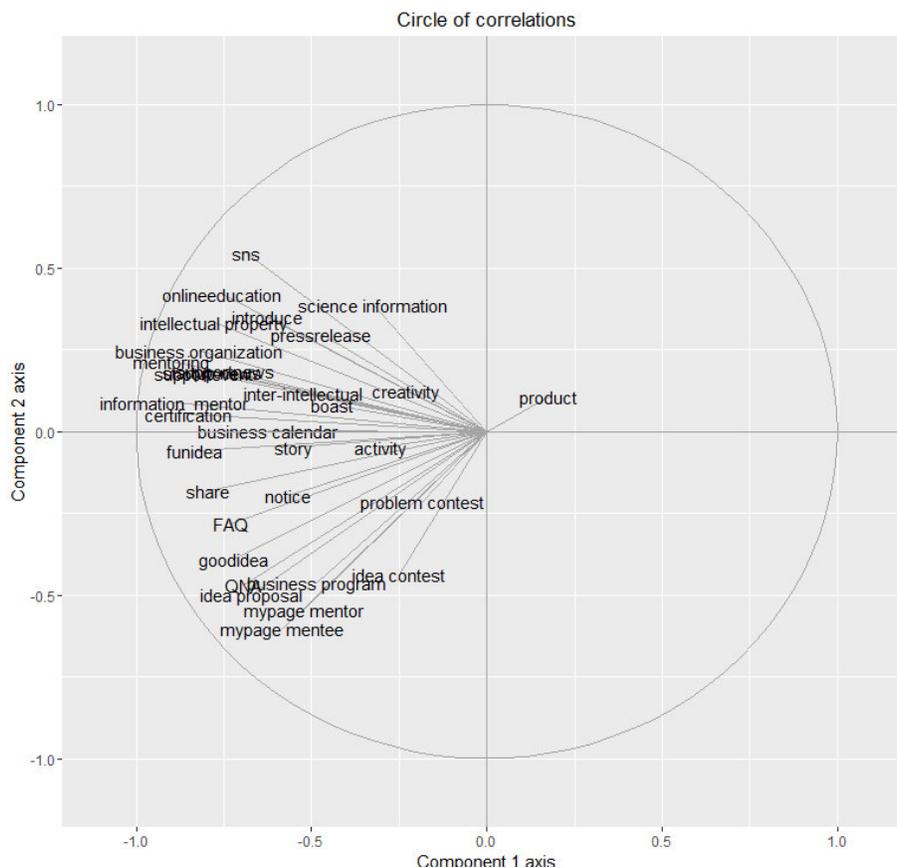


Figure 3: Biplot of First 2 Principal Component

#### IV. CONCLUSION

This study is significant in that it has directly analyzed user patterns with data. After checking a gap between the operator’s intention and users’ actual usage, a ground for service improvement could be established. Both GA and R showed their powerful usage and broad range of scope, implying their possibility in diverse fields such as analysis system automation. In particular, what matters is the actual use of analysis results. As confirmed the analysis results, it is able to get a lot of insights with basic EDA on the data only. After checking basic statistics taking the page view as a time series, it was possible to find out what service was most popular and what service has been continuously used. If observed with multi-aspects on more dimensions and metrics, growth hacking could be introduced effectively. This study focused on statistical modeling against both session and page view. First, in a serial regression model, it was able to get a clue from what service we need to find a factor which can improve the session (KPI). This concept might be somewhat far from the actual result ‘sum of page views,’ a high-quality growth of diverse services is more important than simple outcome model, considering the characteristics of public policies. Hence, there might be a necessity of developing a regression model to check complex correlations rather than aggregate correlations. As stated in Table 1, the idea contest reveals the highest correlation with 0.67. For the actual improvement of outcome in session, therefore, it is most desirable to improve the idea contest services. If viewed from the variation perspective (Table 2), however, there should be analysis on support-news services for the even growth of services. Because overall page views are not great and the CV is too, the improvement of outcome indexes and achievement of public goals can be expected at the same time. However, things can differ in the product and social media. While the sum of page views is low, the CV is high. In addition, the regression model’s coefficient was significant. Therefore, service stability and consistency improvement should be handled prior to others. Therefore, interpretation and analysis considering service characteristics and status might be needed. The PCA in (Table 3) reveals the results from the other perspective. While the previous analysis results are performance and improvement-oriented, PCA results were aimed to check the basic concept and objectives of

services. When a website was developed, services were divided into five groups, and specific service pages were developed in the Online Creative Economy Town. Basically, according to the purport of 'Idea Commercialization Platform,' both support and participation from the service perspective were included, focusing on 'Idea challenge' and 'Business Information'. Then, 'Idea Playground' was even configured to spread creative culture from the supplier's viewpoint precisely. The service grouping by actual users' needs was confirmed with PCA results. First components were as high as 40% in the proportion of variance. Based on the services with high loading, they were named 'Regular Contents.' Second, even though components were included in the purpose of the main services of the website as the idea mentoring-related service, the proportion of variance was as low as 9.7%. This exceptional result reveals that the spread of contents-based creative culture as well as idea commercialization is found in terms of a direction of website development. Unlike the operator's intention, in addition, the consumption of contents does not occur in the 'Idea Playground' only. As explicitly confirmed in (Figure 3), all service pages except for the product belong to the negative area of the axis of the component #1. That is, most services include contents-related elements, and the major services of the 'Idea Playground' represent the typical part. In other words, contents-consuming and productive participation elements are not effectively separated in most services. However, there should be a further study on whether or not this result has positive or negative meaning. It appears to be the limitation of the page view in fact. However, if data can be constructed from the other standpoint with more specified page path, intuitive analysis might be possible. Under current low-growth global economic trend, this platform is the starting point for innovation as a part of government-led policies. Therefore, it is needed to keep analyzing user behavior in a deeper and more meticulous manner.

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## Promotion of Online-Offline Mentoring Linkage with Venture Capital

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### Abstract---

**Background/Objectives:** Creative Economy has been proposed as a solution to promote economic growth after creating a new growth engine through the promotion of business startup with innovative technology. The Creative Economy Town and the Creative Economy Innovation Center were created in order to do this by providing online and offline mentoring and commercialization support for startups.

**Methods/Statistical Analysis:** I studied the role of Venture Capital to connect on and off line in the Creative Economy Town and the Creative Economy Innovation Center.

**Findings:** In this research, the involvement of Venture Capital in the activation of startup technologies both in the creative ideas and mentoring through its actual realization by acting as an accelerator will increase available funding for technology and will actively contribute in new job creation

**Keywords---** Creative Economy, Creative Idea, Mentoring, Creative Economy Town, Creative Economy Innovation Center, Venture Capital (VC).

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## I. INTRODUCTION

Continuing forward from the Knowledge-based economy, the new global competitive environment requires Technological Innovation and Development to drive a country's competitive advantage <sup>1</sup>. In a knowledge information society, the Era of Creative Economy in which new values are created through knowledge connection and convergence among industries has come <sup>2,3</sup>.

The Park Geun-hye administration has created a new paradigm called "Creative Economy". This new paradigm is an integrated approach to commercialization of proposing new ideas and developed through mentoring from experts in the Creative Economy Town(online)<sup>4</sup> and the Creative Economy Innovation Center(offline)<sup>5</sup>. In this study, we propose the role of venture capital groups in the mentoring stage for technology innovation and creation in the Creative Economy Town and the Creative Economy Innovation Center.

On September 30, the Creative Economy Town celebrated its 3rd anniversary. For the past three years, people's interest and visit to the Creative Economy Town have gradually increased. As a result, a total number of visitors topped 3.5 million with 37,000 ideas. In addition, the number of supports on business connection for commercialization such as establishment of technology licensing, technology development and prototype development exceeded 11,000. In the Creative Economy Town, anyone is able to propose his/her idea and get mentoring service on the commercialization of the idea from an expert (online mentor). In fact, some excellent ideas have actually generated some sales through commercialization<sup>3</sup>.

As online mentoring is provided in the Creative Economy Town, there has been a need for an offline mentor-mentee service. As a result, the Creative Economy Innovation Center opened in 18 major districts, starting with the Daegu Creative Economy Innovation Center. Therefore, the functions and programs of the local agencies are linked, and customized technical & financial assistances are provided in a one-stop system, playing a hub role for regional innovation. In other words, the information needed for commercialization has been linked with the lifecycle services through the Creative Economy Town and Creative Economy Innovation Centers.

## II. VENTURE CAPITAL

Venture capital shares management outcome with the invested company instead of taking a high risk by investing in early-stage businesses with high growth potential. At an investment review, it focuses more on the company's technology, market size and future growth potential than on current mortgage and financial strength as seen in Table 1.

Table 1: Venture Capital vs. General Financial Institution

Category	Investment Type	Burden of Risk	Payback Method
Venture Capital	Investment	High Risk	Equity, IPO, M&A, etc.
General Financial Institution	Loan	Low Risk	Collection of the principal and interest

Venture Capital acts as an accelerator by being present from the birth moment of the new idea through its development and providing both the technological and commercial knowledge for product development to startups and by creating a network of both initial investors and venture capitalists which will open sales channels to both domestic and international markets.(Figure 1)

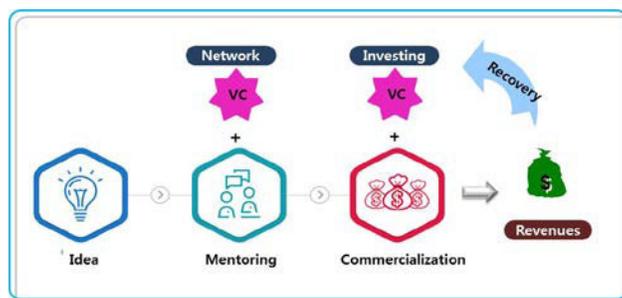


Figure 1: The Role of Venture Capital Groups

### A. *Venture Capital Networking*

Startups are matched to successful Venture Capital Groups which have developed the know-how, while managing their investments, to mentor them from the idea development stage so as to avoid common pitfalls. The services include training and education, management, publicity and promotion, patent management know-how. Services may even include marketing, business management, financial management consulting to guarantee successful management.

### B. *Participation of Successful Venture Capital as a Mentor*

Venture Capital Groups offer startups access to necessary specialists in such fields as technology export and marketing, fiscal accounting, patent law, standardization and certification, and intellectual property. This networking will allow startups to either hire or consult with these specialists and will even allow them meet prospective international investment funds which will open up new prospective markets to them. Currently, the Israeli YOZMA Fund has opened an office in Korea and is offering both funding and mentoring services to both startups and other venture capital groups.

### C. *Improvement of Network Accessibility as Complementary Asset*

Start-ups face difficulties when trying to secure complementary assets by themselves so as to complete commercialization of new technology and information services and need access to a more extensive network of resources. Although national R&D projects may be able to provide the financial means to commercialize a product, it is unable to provide complementary services such as manufacturing, marketing and distribution resources. The Creative Economy Town and the Creative Economy Innovation Center provide on and offline mentoring on technology, markets and commercialization information and thus offer many of these complementary services and support but the Venture Capital network is needed in order to improve access to tangible innovation and results.(Figure 2)

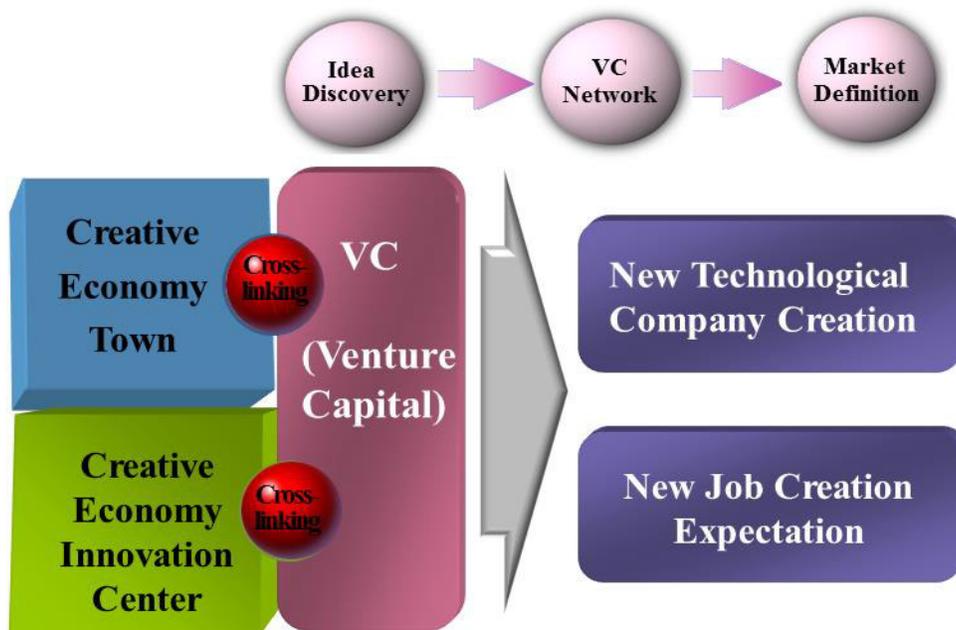


Figure 2: Cooperation with Venture Capital Groups

## III. CONCLUSION

Before the emergence of a venture boom in 1997, venture was perceived as an issue in the U.S. or other advanced countries only. For the past decade since the launching of the venture policy, however, venture business has been stabilized socially and institutionally. In this sense, we need a time to establish a virtuous circle across our society, in which the connection for the commercialization of ideas becomes active through online and offline mentoring services in the Creative Economy Town and Creative Economy Innovation Centers, and business startup is accelerated with the aggressive investment from venture capital.

In the research, it was found that Venture Capital naturally stimulates the development of an idea into a network and then into a commercial product. Funding by Venture Capital and on and offline mentoring are the bridge between the Creative Economy Town and the Creative Economy Innovation Center and the creation of Korean versions of such success stories as Google, Facebook, and Alibaba.

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## Effects of Simulation Program on the Clinical Competency of Nursing Students

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### Abstract---

**Background/Objectives:** The purpose of this study was to investigate the effects of simulation program on the clinical competency of nursing students.

**Methods/Statistical Analysis:** This study used a quasi-experimental design. Sixty-one students were required to participate in 4hrs cardiopulmonary resuscitation simulation program. The clinical competencies were measured both for the baseline, as well as after intervention. The questionnaire was composed of competencies of communicating with medical team members, performing role as a team member, cooperating with team members, and evaluating and reporting the results.

**Findings:** The competencies of communicating, performing, cooperating, and evaluating and reporting were showed significant improvement after intervention. There were significant relationships among study variables. In this study, simulation program is effective to enhance the ability to communicate with medical team members, to perform role as a team member, to cooperate with team members, and to evaluate and report results.

**Improvements/Applications:** Thus faculties and nursing educators can consider simulation program as a new method for preparing clinical experiences in the real world.

**Keywords---** Simulation, Education, Competency, Nursing, Student.

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## I. INTRODUCTION

Competency is one of most important factors in clinical environment. Nurse competence predicates the application of knowledge and skills in responding appropriately to the dynamic patient-care environment<sup>1</sup>. Confidence was conceptualized in nursing as a caring attribute fostering mutual trust and respect in the nurse-patient relationship<sup>1</sup>.

The complexity of the clinical setting requires competence-building begin in introductory courses, establishing foundational skills for critical thinking and prioritization<sup>2</sup>.

In previous study<sup>3</sup>, competence was described in three ways: (1) as task-based or behaviorist, which depends upon 'direct observation of performance' for evidence;(2) as pertaining to the 'general attributes of the practitioner that are crucial to effective performance' and this approach relies on generic competencies being instilled in practitioners; (3) as bringing together a range of general attributes, such as knowledge, skills and attitudes, in such away that these specifically address the needs of the practitioner.

Simulation is an educational process provided National Council of State Boards of Nursing (NCSBN) which can imitate the working environment and require learners to indicate procedural techniques, decision making, critical thinking and develop higher learning<sup>4,5</sup>. Simulation "provides educators with standardized ways to have students work as a team, collaborate with others, problem solve, make decisions and use critical thinking in a safe environment"<sup>6</sup>.

Simulation experiences allow students to practice patient care in a moderately stressful environment ant to decrease associated fears of failure with live patients. Such an environment may increase student self-confidence and competence during actual clinical experiences<sup>7</sup>.High-fidelity simulation has been proposed as a novel, supplemental teaching-learning strategy to enhance the transfer of student competence to the clinical nursing environment<sup>8</sup>.

Park and Lee <sup>9</sup> reported the use of clinically based learning in 'on campus' activity promotes self-efficacy, increases confidence and motivation to learn, improves clinical performance and enhances critical thinking and gains in knowledge and concur, reminding us that simulation appropriately incorporates elements of the real world to achieve specific goals related to learning. And other systematic review study<sup>10</sup> reported the clinical performance ability after simulation-based learning increased in 75% cases, and that knowledge was expanded in 40% cases.

Therefore the purpose of this study was to investigate the effects of simulation program on the clinical competency of nursing students.

## II. METHODS

### A. *Participants and Procedures*

Participants of this study were 61 senior nursing students in Chungnam, South Korea.Data were collected using a self-reported questionnaire from September, 2015 to December, 2015.

Participants were assured of anonymity and confidentiality and informed consent was obtained from each subjects.

### B. *Statistical Analysis*

Data were analyzed by t-test to figure out the differences of clinical competencies after intervention. And correlation analysis was used to study statistical relationships among the variables.

### C. *Study design and Measures*

This study used a quasi-experimental design as follows. Sixty-one students were required to participate in 4hrs cardiopulmonary resuscitation simulation program. The clinical competencies were measured both for the baseline, as well as after intervention.

The questionnaire was composed of competencies of communicating with medical team members, performing role as a team member, cooperating with team member, and evaluating and reporting the results. The levels of clinical competencies were measured by 5-likert scale, with higher scores indicating a greater level of competency.

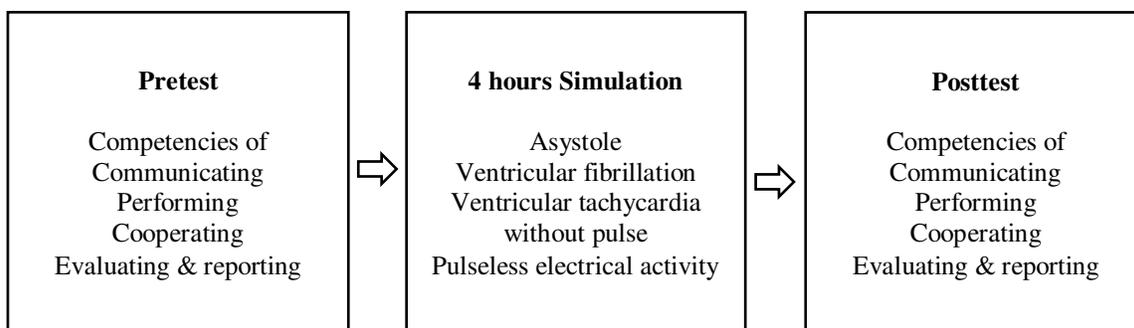


Figure 1: Study Design

In this study, participants were experienced 4hrs cardiopulmonary resuscitation simulation program. We have 4 scenarios (asystole, ventricular fibrillation, ventricular tachycardia without pulse and pulseless electrical activity scenarios).

The 12 teams were organized by 5 or 6 students as a group. Before the simulation, students got as brief information of patient. When the simulation started, students decided how they assess the patient and what they do for the patient. According decisions and nursing interventions of students, nursing faculty showed proper responses using high fidelity simulator (SimMan3G®, Laerdal, USA), for example, the rhythm and shape of echocardiogram, level of O2 saturation, and consciousness, etc. After the simulation, students debriefed the situation and their intervention.

### III. RESULTS

The sixty one students were participated in this study. All of students were senior grade, and they completed cardiology nursing curriculum and clinical practicum before simulation. Of the participants, 95.1 % were females and the mean of age was 23.06.

#### A. Differences of Clinical Competence After Simulation Program

The mean score of competencies of communicating, performing, cooperating, and evaluating and reporting were 3.62±0.75, 3.88±0.73, 4.05±0.69, and 3.67±0.72 at baseline as shown as in table 1. After 4hrs cardiopulmonary resuscitation simulation program, mean of competencies of communicating, performing, cooperating, and evaluating and reporting were 4.49±0.59, 4.61±0.58, 4.64±0.54, and 4.55±0.59, respectively.

In this study, competencies of communicating (t=-7.840, p<.001), performing (t=-6.877, p<.001), cooperating (t=-6.658, p<.001), and evaluating and reporting (t=-8.447, p<.001) were showed significant improvement after intervention.

Table 1: The Differences of Competencies of Communicating, Performing, Cooperating, and Evaluating & Reporting (N=61) 2.4 Simulation Program

Variables	Pretest M±SD	Posttest M±SD	t(p)
communicating	3.62±0.75	4.49±0.59	-7.840* (<.001)
performing	3.88±0.73	4.61±0.58	-6.877* (<.001)
cooperating	4.05±0.69	4.64±0.54	-6.658* (<.001)
evaluating & reporting	3.67±0.72	4.55±0.59	-8.447* (<.001)

\*p<.001

#### B. Correlation Among Competencies of Communicating, Performing, Cooperating, and Evaluating and Reporting

The level of clinical competency of communicating showed significant correlation with the level of performing, cooperating, and evaluating and reporting (r=.708, p<.001; r=.654, p<.001; r=.722, p<.001) in table 2. And clinical competency of performing had significantly positive relationship with cooperating, and evaluating and reporting (r=.900, p<.001; r=.835, p<.001). The cooperating competency showed statistically significant relationship with evaluating and reporting (r=.783, p<.001).

Table 2: Relationship among Competencies of Communicating, Performing, Cooperating, and Evaluating &amp; Reporting (N=61)

Variables	communicating	performing	cooperating	evaluating & reporting
communicating		.708(<.001)	.654 (<.001)	.722 (<.001)
performing			.900(<.001)	.835 (<.001)
cooperating				.783 (<.001)
evaluating & reporting				

\*p&lt;.001

#### IV. CONCLUSION

After 4hrs cardiopulmonary resuscitation simulation program, clinical competencies were showed significant improvement among nursing students. And the level of clinical competencies showed significant correlations with each other variables.

Simulation based education showed positive effect to decrease anxiety and to increase self efficacy among nursing students who face the first clinical practice<sup>11</sup>.When similar scenarios were repeated to the same participants, self-efficacy and clinical judgment increased<sup>10</sup>.High fidelity simulation has advantages and disadvantages <sup>12</sup>. Students can see physiological effects on the patient that are not available by book or in real life, and can make errors in a safe environment, and improve confidence, critical thinking and decision making skills. But there are disadvantages also. Small number of students can interact with the mannequin at one time. Some students experienced anxiety and cannot see the full picture of the patients and just focusing on one or few elements.

In Korea, Kim and Jang <sup>13</sup>reported the group who had the simulation-based education showed significantly higher knowledge and clinical performance ability for cardio-pulmonary emergency care compared with the control group who had traditional education. These results indicate that a simulation-based education is an effective teaching method to improve knowledge and clinical performance ability in new nurses learning cardio-pulmonary emergency care. Blum et al <sup>14</sup> showed an overall improvement in self-confidence and competence after simulation program.

In this study, simulation program is effective to enhance the ability to communicate with medical team, to perform role as a team member, to cooperate with team members, and to evaluate and report the results. Thus faculties and nursing educators can consider simulation program as a new method for improving clinical competency and preparing clinical experiences in the real world. Further study is needed to identify the effect of a simulation on cognitive outcomes such as critical thinking and problem solving abilities.

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## Academic Personality Type and Self-Directed Learning in Nursing Students

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### Abstract---

**Background/Objectives:** This study was designed to explore difference of self-directed learning related to academic personal type on nursing students.

**Methods/Statistical analysis:** The data was collected using questionnaire consisting of the academic personal type and self-directed learning ability. The participants were 156 nursing students who are currently in their third and fourth year of their undergraduate program. The analyses were performed using IBM SPSS 19.0. The data were analyzed with descriptive study, t-test, ANOVA, and post-hoc test.

**Findings:** The percentages AR, CG, AS, and CS on APT were 49.4%, 36.5%, 10.9% and 3.2%. The mean scores of learning plan, learning practice, learning evaluation and the overall were  $3.02 \pm 0.82$ ,  $3.11 \pm 0.75$ ,  $3.04 \pm 0.34$  and  $3.08 \pm 0.52$ . Differences of self-directed learning related to academic personality types were CS, AS, CG, AR.

**Improvements/Applications:** The result indicated that academic personal type influences self-directed learning ability. There should be more emphasis placed on the development of positive self-directed learning ability according to academic personal type of nursing students.

**Keywords---** Personal Type, Self-Directed Learning, Nursing Students.

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## **I. INTRODUCTION**

Self-directed learning has become one of the primary aims of education in the last few decades. Self-direction is the basis of all type of learning<sup>1</sup>. Self-directed learning tends to be associated with academic achievement<sup>2</sup> and with personality traits. Researchers have also noted that learners who are self-directed have higher levels of self-efficacy<sup>3,4</sup>. Personality traits explain the content of self-directed learning<sup>5</sup>. Roberson and Merriam<sup>6</sup> also claimed that developmental processes of influencing self-directed learning are related to personality traits.

In nursing students, Diagnosing personality can differentiate student's learning attitude. It is important to develop teaching-learning strategies according to their personality, which can help them to improve their academic achievement<sup>7</sup>. And Learning outcomes consisted of teamwork skill in nursing skill<sup>8</sup>. So diagnosing for academic personality can differentiate student's learning attitude in nursing students. It is important to develop teaching-learning strategies according to their personality, which can help them to improve their academic achievement for nursing education<sup>9</sup>

Therefore, this descriptive study was done to identify self-directed learning ability of nursing students according to their academic personal types.

## **II. MATERIALS AND METHODS**

### **A. Study Design**

This study used a descriptive design to explore difference of self-directed learning related to academic personal type on nursing students.

### **B. Sample**

Participants consisted of 156 nursing students in two nursing colleges. To determine the appropriate number of participants, we calculated the sample size using G-power 3.1 program. Based on a significance level ( $\alpha$ ) of 0.05, a statistical power ( $1-\beta$ ) of 0.95, an effect size of 0.3, the minimum sample size of 138 respondents was calculated for correlation analysis.

### **C. Measurements/Instruments**

The academic personal type was measured by scale of the U&I (Uprise & Improve) academic personal type<sup>10</sup>. 52 all items were measured using a 2-point type scale (0 or 2 points), where higher scores indicated stronger academic personal type. The subscales were consisted of actual-spontaneous learner(AS), actual routine learner(AR), conceptual specific learner (CS), conceptual global learner(CG). Kim<sup>9</sup> reported a Cronbach's alpha coefficient .68(AS), .57(AR), .60(CS), .61(CG). In this study, Cronbach's alpha was .72(AS), .75(AR), .70(CS), .80(CG).

The self directed learning was measured by scale of self-directed learning ability<sup>11</sup>. 40 all items were measured using a 5-point Likert-type scale (1 to 5 points), where higher scores indicated high level self-directed learning ability. The subscales were consisted of learning plan, learning practice, learning evaluation. Lee<sup>11</sup> reported a Cronbach's alpha coefficient .76. In this study, the internal reliability coefficient (Cronbach's alpha) was .88.

### **D. Data Collection**

We visited two colleges. The data were collected through self-reported questionnaires from 14, March to 22, April, 2016. Informed consent was obtained prior to participation from students. The questionnaire took 30 minutes to complete. Excluding the incomplete questionnaires, data from 156 nursing students were collected and used for the present analysis.

### **E. Data Analysis**

The analyses were performed using IBM SPSS 20.0. General characteristics and degree of variables were analyzed using descriptive statics, One-way ANOVA and Scheffe test.

## **III. RESULTS**

### **A. General Characteristics**

General characteristics of participants were presented Table 1. A total 156 nursing students participated

in the study. The majority of participants were female (n=140, 89.7%), half (n=78, 50.0%) were junior nursing students. 34.6% of participants entered nursing school for employment. 57.72% of participants answered that they have a good interpersonal relationship.

Table 1: General Characteristics

Variables		(N=156)	
		n	%
Sex	Female	140	89.7
	Male	16	10.3
Grade	3rd	78	50.0
	4th	78	50.0
Reason for entering nursing	Employment	54	34.6
	Aptitude	37	23.7
	Economic safety	7	12.5
	Profession	34	21.8
	Academic score	6	3.8
Teaching method	Lecture	109	69.9
	Discussion	47	30.1
Interpersonal relationship	Good	90	57.7
	Fair	62	39.7
	Bad	4	2.6

**B. Degree of Variables**

Academic personal type of participants was presented Figure1. The percentages AR, CG, AS, and CS on APT were 49.4%, 36.5%, 10.9% and 3.2%.

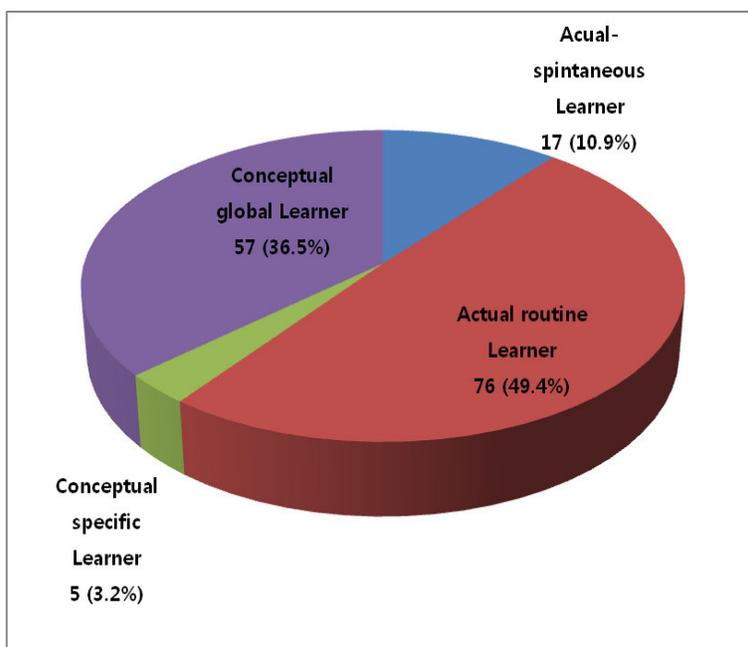


Figure 1: Academic personal Type of Participants (N=156).

And degree of self-direct learning mean was presented Table 2. The mean scores of learning plan, learning practice, learning evaluation and the overall were 3.02±0.82, 3.11±0.75, 3.04±0.34 and 3.08±0.52.

Table 2: Degree of Self-Directed Learning  
(N=156)

Variables	Min	Max	M±SD
SDL	1.00	5.00	3.08±0.52
Learning plan	1.00	5.00	3.02±0.82
Learning practice	1.00	5.00	3.11±0.75
Learning evaluation	1.00	5.00	3.04±0.34

**C. Academic personality type and self-directed learning**

Differences of self-directed learning related to academic personal types were presented Table 3. There was a significant difference in self-directed learning according to academic personality type (F=5.00, p<.001). The K-APT score for academic personality type were linked CS(M±SD=3.15±0.25), AS(M±SD=3.10±0.61), CG(M±SD=3.08±0.34), AR(M±SD=3.01±0.99). Differences of self-directed learning related to academic personality types were CS, AS, CG, AR.

Table 3: Differences of Self-Directed Learning Related to Academic Personality Types

Variables		M±SD	F	P Scheffe
APT	AS	3.10±0.61	5.00	<.001 CS>AS>CG>AR
	AR	3.01±0.99		
	CS	3.15±0.25		
	CG	3.08±0.34		

APT: Academic personal type

**IV. DISCUSSION**

In this study, participants' percentages AR, CG, AS, and CS on APT were 49.4%, 36.5%, 10.9% and 3.2%. In a previous study in which the same tool was used as in this study, participants' percentages CG, AR, AS and CS on APT were 55.7%, 28.3%, 8.4%, and 7.6% in education students<sup>12</sup>. These results were explained the academic personality type of nursing students were according to profession trait and teaching method for practices and program outcomes.

The mean scores of learning plan, learning practice, learning evaluation and the overall were 3.02±0.82, 3.11±0.75, 3.04±0.34 and 3.08±0.52. SDL integrates self-management (management of actions and resources), self-monitoring (the process by which the learners monitor, evaluate and regulate their cognitive learning strategies), and motivation and volition in initiating and maintaining the efforts<sup>13,14, 15</sup>.

Differences of self-directed learning related to academic personal types were presented Table 3. There was a significant difference in self-directed learning according to academic personality type. Differences of self-directed learning related to academic personality types were CS, AS, CG, AR. This result indicated that a significant student profile (SDL according to APT) exists among beginning students of professional nursing. So, it is important to investigate academic personality type and self-directed learning among nursing students continuously.

PBL teaching methods, such as that applied in nursing was important because it gave a positive impact on the creative and divergent thinking to accelerate the promotion of autonomy<sup>16</sup>. And opinions about teamwork, sharing your thoughts with colleagues point is that you can see yourself in other people's positions were evaluated as positive effects<sup>16</sup>. And the PBL education is effective in improving some areas of students' learning competency<sup>17</sup>. In the present study, lecturers instructed the control group with lecturer-centered, textbook-oriented traditional instruction; they exposed the experimental group to problem-based learning, in which students worked with ill-structured problems<sup>18</sup>. Chakravarthi et al's<sup>18</sup> results revealed that PBL students had higher levels of intrinsic goal orientation, task value, use of elaboration learning strategies, critical thinking, metacognitive self-regulation, effort regulation, and peer learning compared with control-group students. However, this approach should be applied considering the academic personality type of the nursing student, and a detailed teaching method according to academic personality type is needed. So study is

needed to develop PBL programs for various clinical topics and consider that the academic personality type.

This result suggests that the SDL and APT method is a challenging process for faculty and nursing students. The faculty members of nursing students should assess and determine the appropriateness of SDL, irrespective of the APT of nursing students. The successful introduction of SDL into curricula requires students' academic personality type. The findings of this study indicate that academic personal type influences self-directed learning ability. There should be more emphasis placed on the development of positive self-directed learning ability according to academic personal type of nursing students. Therefore, approaches to improve self-directed learning and academic personality type on effects are necessary.

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## A Study on the Views of Marriage, Fertility and Family Function in University Students

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### Abstract---

**Background/Objectives:** The purpose of this study was to investigate cohesion and adaptability of family and marriage and fertility behaviors of university students.

**Methods/Statistical analysis:** A descriptive research design was employed. Data were collected from 340 university students who lived in two provinces, S city, Dcity. Subjects were completed the following questionnaires: cohesion and adaptability of family and survey paper on dynamics of marriage and fertility. The data were analyzed with frequency, correlation, ANOVA, by SPSS.

**Findings:** Marital status have significant difference depending on the distinction of sex and the marriage life of their sibling. In family function, marital status have no significant difference depending on the cohesion and adaptability of family. 26.1% of Subjects replied that marriage is a must, 8.6% of subjects said that marriage is an option.

**Improvements/applications:** Therefore, to overcome the low birthrate, the starting point of solving this problem was to grasp deeply into understanding of university students about marriage and fertility.

**Keywords---** View of Marriage and Fertility, Family Function, University Students.

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## I. INTRODUCTION

The total birthrate of Korea has been at a record low after finishing 1.08 person in 2005. In an effort to solve the low birthrate of nation, though it was 1.3 in 2014, the rate was the second lowest among the members of the Organization for Economic Cooperation and Development (OECD) after Macao, Hong Kong, and Singapore (1.2)<sup>1,2</sup>. For this reason, the nation is worried about worsen the national competitiveness due to the falling economically active people in our 20s. Moreover, it will threaten the nation's existence. To tackle our low birthrate problems, I think that we need to continue pursuing women, the main body of delivery aggressively. Getting married has not become prerequisite but a matter of personal choice because more women are involved in economic activities in late 20s as they are enrolled in universities and delay marriage and child birth<sup>3,4</sup>. The average age for a woman to marry is now 30.8 years and they give birth to baby at 32 years, this time of decline reproductive function and fertility rate. Though the late childbearing of women in their 40s were 10.1% cause by delayed marriage, that is probably going to be delivery of premature baby and low-birth baby, threatening the birthrate. In reality, mother who looks after younger child is under a lot of stress many stress<sup>5-7</sup>.

In discussing the low birthrate, the pressure on child-rearing carries the most weight. It is reported that among young, single and salaried workers in their 20s and 30s, 14% do not want to have their baby because childrearing and children's education are a big burden for them (48.3%), they also want to enjoy their life to the full (31.7%)<sup>8-10</sup>. This implies that there is a change in sense of value and awareness on childbirth. So, it would be better to solve the problem, focusing on changes in sense of marriage, childbirth, child rearing, and children's education to overcome the low birth.

Accordingly, researcher want to make sure that what are their awareness about marriage and fertility before trying to change the value of marriage and fertility in university students, a prospective the main body of delivery<sup>11</sup>. Because awareness on the fertility in university students will be an important factor that it have an direct influence on the marriage and the childbirth rate. Therefore, we can develop the intervention program that prevent our low birth rate.

The purpose of this study was to investigate cohesion and adaptability of family and marriage and fertility behaviors of university students. The specific objectives of this study were as follows:

- 1) To identify the general characteristics general of subjects.
- 2) To identify the awareness of marriage and fertility of subjects.
- 3) To identify marital status, general characteristics, and family function of subjects.
- 4) To identify a view of marriage of subjects.

## II. METHODS

### A. *Research Design and Subjects*

This study is a descriptive research to identify actual conditions on views of the marriage and the fertility in university students. Subjects in this study included 340 university students are agreed to participate this study, they are living in 2 provinces, S and D cities. In order to identify the adequacy of the sample size, G\*Power 3.1.4 program was used<sup>12</sup>, alpha=0.5, power=0.95, and effect size of 0.05. The data were collected from October 1 to March 30, 2014.

### B. *Measurement on Marriage and Fertility*

Views of marriage and fertility were by revised the questionnaire, based on a nationwide survey on marriage and childbirth which was developed by Choi, which standardized by Lee et al. This instrument include 17 items, 7 items of general characteristics, 4 items of awareness of marriage, 4 items of awareness of childbearing, and 2 items related to childbearing. Views of marriage is composed of 24 items with 5 score of Likert scale. Instrument of family function include cohesion and adaptability of family, Cronbach's  $\alpha$  value of the internal reliability of the data, cohesion of family'  $\alpha$  was .902, and adaptability of family'  $\alpha$  was .797.

### C. *Data Analysis*

Data analyzed by SPSS 18.0 Window program. For the characteristics of subjects' demographic and awareness of marriage, awareness of childbearing, views of marriage, and family function include descriptive statistics were calculated.

### III. RESULTS

#### A. Demographic Characteristics of Subjects

General characteristics of subjects are as shown in table 1. All of those subjects are between 18 and 28 years old, the average age of the subjects was 20.11 years old. 89 subjects (26.2%) were college men. In major, 54.7% of subjects are medical and health field, most of the subjects are no religion (48.5%). 84.4% of subjects are living with their parents and brothers and sisters. 7.4% of subjects are living with grandparents and parents. Subjects who grow up in big cities were 52.4%, for the monthly income of house, 43.2% of subjects belong to more than 1 million won less than 3 million won. 49.7% of subjects, their mothers have a job.

Table 1: General Characteristics of Subjects

		(n=340)
Characteristics	Classification	N (%)
Sex	Male	89(26.2)
	Female	251(73.8)
Major	Medical and Health	186(54.7)
	Humanities and Social Sciences	28(8.2)
	Natural Sciences	48(14.1)
	Others	71(20.9)
	Non- response	7(2.1)
	Religion	Christian
Religion	Catholic	31(9.1)
	Buddhism	50(14.7)
	Others	2(0.6)
	No-religion	165(48.5)
	Non- response	1(0.3)
Family members	Parents	16(4.7)
	Parents, brothers and sisters	287(84.4)
	Grandparents, parents, brothers and sisters	25(7.4)
	Alone	1(0.3)
	Others	10(2.9)
	Non- response	1(0.3)
Growing area	Big city	178(52.4)
	Small city	110(32.4)
	Town	50(14.7)
	Others	1(0.3)
	Non- response	1(0.3)
Monthly income (10,000won/m)	<100	13(3.8)
	100~299	147(43.2)
	300~499	126(37.1)
	≥500	45(13.2)
	Non- response	9(2.6)
Job of father	Professional	35(10.3)
	Official, a company employ	120(35.3)
	Commerce, farming, fishery	106(31.2)
	Others	72(20.6)
	None	5(1.5)
Job of mother	Non- response	4(1.2)
	Yes	169(49.7)
	No	171(50.3)

### B. Awareness of Marriage and Fertility of Subjects

Awareness of marriage and fertility of subjects are as shown in table 2. 15% of the subjects have married siblings, and 69.8% are satisfied with their family and home, as much as 91.4% of the subjects said that they will be marry in the future and 76% said that there really is an ideal marriage age.

On fertility, 63.3% of the subjects said to must have a baby, while, 36% of the subjects are okay to have no baby. Ideal number and real number of babies that they want is same (2 babies). Also subjects replied that the child-rearing is the responsibility of both husband and wife (85.5%). 41.8% of female subjects want to carrying on with their work after give birth to a baby, 33.8% replied that they are going back to work after finishing the child-rearing.

Table 2: Awareness of Marriage and Fertility of Subjects

Characteristics	Category	N (%)
Having married siblings	Yes	15(4.4)
	No	318(93.5)
Satisfaction on home	Satisfaction	234(68.8)
	Normal	81(23.8)
	Dissatisfaction	20(5.9)
Planning to get married	Yes	308(90.5)
	No	29(8.5)
The age for marriage	Yes	256(75.3)
	No	80(23.5)
Awareness of fertility	Must	212(62.4)
	Do not care	104(30.6)
	Need a son	4(1.2)
	Need a daughter	6(1.8)
	Others	5(1.5)
Number of babies (ideal)	No	13(3.8)
	1	17(5.0)
	2	230(67.6)
	3	68(20.0)
	Over 4	8(2.4)
Number of babies (reality)	No	38(11.2)
	1	30(8.8)
	2	194(57.1)
	3	64(18.8)
	Over 4	11(0.3)
Responsibility of child-rearing	Mother	5(1.5)
	Father	10(2.9)
	Husband and wife	288(84.7)
	One person among the family members	30(8.8)
	Nation	3(0.9)
Working mom	Yes	141(41.5)
	No	71(20.9)
	Yes after child rearing	114(33.5)
	Others	10(2.9)
Main body in solving the low birth	In person	106(31.2)
	Company	13(3.8)
	Government	196(57.6)
	Community	10(2.9)
	Others	11(3.2)

### C. Marital Status, General Characteristics, and Family Function

In general characteristics, marital status have significant difference depending on the distinction of sex ( $F=33.980$ ,  $p<.001$ ), marital status have significant difference depending on the marriage life of their sibling ( $F=7.117$ ,  $p=.008$ ). In family function, marital status have no significant difference depending on the cohesion and adaptability of family. However, marital status have significant difference depending on the 2nd item; good friend ( $F=4.766$ ,  $p=.030$ ), the 3rd item; work together ( $F=3.971$ ,  $p=.047$ ), the 7th item; get together ( $F=3.928$ ,  $p=.048$ ) in cohesion of family as seen in table 3

Table 3: Marital status and Cohesion of Family

Item	Marital status	Mean $\pm$ SD	t/F(p)
Call for help in need	Yes	3.95 $\pm$ .832	.37
	No	3.68 $\pm$ .791	(.546)
Recognize each other	Yes	3.88 $\pm$ .763	4.77
	No	3.94 $\pm$ .574	(.030)
Love to work together	Yes	3.57 $\pm$ .951	3.97
	No	3.61 $\pm$ .761	(.047)
Be down with family	Yes	3.60 $\pm$ .884	.49
	No	3.55 $\pm$ .850	(.486)
Have a leisure together	Yes	3.29 $\pm$ .967	.16
	No	3.39 $\pm$ .882	(.689)
Everyone get together	Yes	3.85 $\pm$ .847	1.16
	No	3.71 $\pm$ .973	(.283)
Feel closer each other	Yes	3.23 $\pm$ .999	3.93
	No	3.16 $\pm$ .820	(.048)
Be easy to do something	Yes	3.41 $\pm$ .938	.10
	No	3.42 $\pm$ .992	(.751)
Clear up a problem by talking about it	Yes	3.65 $\pm$ .983	.04
	No	3.52 $\pm$ .926	(.851)
Be important to share family' fate	Yes	4.02 $\pm$ .835	1.35
	No	3.84 $\pm$ .898	(.247)

#### D. View of Marriage of Subjects

26.1% of subjects replied that marriage is a must, 8.6% of subjects said that marriage is an option. Only 0.9% of subjects said that marriage have important meaning in the life. To the question on the relationship of family come ahead of the individual on marriage, 11.9% of subjects are yes. Also 31.1% of subjects said that I don't object to sex before marriage. 37.4% of subjects said that if crisis of marital cannot be solved, I would better to divorce. To the question on the reasons for the rising age of marriage is social problem, 57.2 % of subjects answer 'no' as seen as table 4.

Table 4: View of Marriage of Subjects

Item	Category	N (%)
Marriage is a must	Yes	88(26.1)
	Normal	81(24.0)
	No	168(49.9)
Marriage is an option	Yes	29(8.6)
	Normal	39(11.6)
	No	269(79.9)
Marriage have important meaning in the life	Yes	3(0.9)
	Normal	46(13.6)
	No	288(85.4)
The relationship of family come ahead of the individual on marriage	Yes	40(11.9)
	Normal	95(28.2)
	No	202(60.0)
I will marry whatever I'm in financial difficulties	Yes	220(65.3)
	Normal	82(24.3)
	No	35(10.4)
I don't object to sex before marriage.	Yes	105(31.1)
	Normal	99(29.4)
	No	133(39.4)
Having planned to marry, it's okay that men and women lived together	Yes	103(30.6)
	Normal	11(32.9)
	No	123(36.5)
If crisis of marital cannot be solved, it is better to divorce	Yes	116(37.4)
	Normal	88(26.1)
	No	123(36.5)
The reasons for the rising age of marriage is social problem	Yes	63(18.7)
	Normal	81(24.0)
	No	193(57.2)

#### IV. CONCLUSION

As far as marriage is concerned, compared with their parent, subjects have different values. Their parents took it for granted that every women will be a mother after marriage. However, subjects also prioritize ego extension through education and social activity before pregnancy and childbirth. Actually, university students have various perspectives on marriage and childbirth. First, they accepted that marriage and childbirth are an uneventful life, second, they take them for granted as the natural order of things and lead a worthy life. They also accept it as fear and a burden.

University students want to be separated from parents and to fulfill a sexual desire through marriage. Also they answered that they do not married because they have no opportunity to meet opposite sex.

The result of this study suggest that university students did not want to divide the roles into gender, rather, they want to do it receiving an education and entering the workforce at the same time. In the views of marriage and fertility. Therefore, to overcome the low birthrate, the starting point of solving this problem was to grasps deeply into understanding of university students about marriage and fertility. Because they will be responsible for growing birth rate and nation's future.

As mentioned above, the correlation on the view of marriage and fertility of university students and the family function needs further study.

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## A Study of Project Management System Linkage for One-stop Participation in National R&D Project

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### Abstract---

**Background/Objectives:** When researchers participate in national R&D projects, a system linkage allowing them to apply in a one-stop system without individual access to each bureau(agency)'s research project application system is needed.

**Methods/Statistical analysis:** Integrated information management system has been developed for researchers to inquire the project notice and apply a project in a one-stop manner when participating in a national R&D project. This system has enabled two-way login linkage by removing a redundant login process in a research management system between the NTIS and each bureau (agency).

**Findings:** This study investigated the system usage rates by researchers from January to September 2016. First, the total number of project notices by the bureau (leading agencies, 12 organizations) linked to the system was as large as 1,365 with 8,043 in terms of the total number of projects applied. Researchers' project usage rates were estimated with login frequency. Specifically, 2,015 cases were found from the NTIS to the leading agency and 3,520 cases from the leading agency to the NTIS. According to examination by month, researchers have continuously used the system. Through the project application information linkage, researchers are able to inquire and edit the project application information. In addition, the system is available for the agencies that do not have a research management system when they apply for the project.

**Improvements/Applications:** In terms of the linkage of project management systems, 16 leading agencies and 2 management institutes are linked. For researchers' convenience, it is needed to expand a linkage with them.

**Keywords---**Application for Project, National R&D Information Management, Positive Term-oriented Login, Research Project Management System, National Science & Technology Information Service (NTIS).

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## I. INTRODUCTION

The Ministry of Education, Science and Technology (MEST) has developed an NTIS as a national R&D portal system which can support R&D efficiency from national R&D planning to the utilization of outcome<sup>1-4</sup>. The government bureaus and offices have named 17 leading agencies for the management of national R&D programs, and these agencies have ordered national R&D projects and executed budget every year to manage the outcome of the agreed projects<sup>5-7</sup>. In order for the government bureaus and leading agencies to manage national R&D programs, R&D project notices are posted after announcing them to order national R&D programs. Then, the government bureaus and leading agencies mostly use an online system through which researchers apply for a project. In the government bureaus and leading agencies which do not have the online system, however, an application is submitted by mail or in person.

In order for researchers to participate in a national R&D project, they need to get access to each bureau/office (leading agency)'s research project management system individually. Then, they are able to inquire the notice and submit an application (new). At present, the NTIS provides an integrated R&D project notice. However, researchers still need to get access to each research project management system individually, which in turn decreases the convenience of the project and research productivity. To improve their participation in national R&D projects, therefore, there should be an integrated information management system in which researchers are able to search the notice and submit (inquire & edit) an application for the project in a one-stop manner<sup>8</sup>.

In this study is developed a national R&D information management system which allows researchers to search the R&D project notice information and apply for and manage the project through linkage with the research project management system of each government bureau or office (leading agency)<sup>9</sup>. In the leading agencies which do not have an online system as well, researchers were permitted to use the national R&D information management system. Therefore, they are able to participate and manage a national R&D project in a convenient fashion through the NTIS' integrated information management system.

## II. LITERATURE REVIEW

For the efficient management of national R&D programs, Korean government designated leading agencies to manage the application, receipt and management of the bureau's R&D programs. For this, they are ordered to operate a research project management system<sup>10-11</sup>. Under this system, however, researchers need to inquire each bureau's systems whenever they apply for a R&D project.

To solve this problem, Korean government planned 'Master Plan (Draft) for Improvement of Pan-government Research Project Management System' with a goal of improving researchers' convenience and establishing a ground for the efficient management of a R&D lifecycle system. In 2013, this bill was resolved by the National R&D Information Management Committee. With this bill, a system was developed fast to provide pan-government project application services in a one-stop manner. Then it's been operated in demonstration by 3 leading agencies (Korea Evaluation Institute of Industrial Technology, Korea Health Industry Development Institute (KKIDI), Korea Institute of Planning & Evaluation for Technology in Food Agriculture, Forestry & Fisheries).

## III. LINKAGE OF THE PROPOSED WORK SYSTEM

### A. Two-Way Login (SSO) Linkage

At the linkage of the research project management systems of the NTIS and leading agencies, researchers need to log in to each system due to the use of a heterogeneous login solution. To solve this user convenience, a two-way login linkage for the research project management system between the NTIS and leading agencies at project application was introduced. In terms of a personal identification key for login linkage, the Science & Technology Researcher Code was used. The Science & Technology Researcher Code is a code granted to researchers to substitute the Resident Registration Number. It was first launched in 2011<sup>12</sup>. To participate in a national R&D program, researchers need to get the Science & Technology Researcher Code. Some agencies ask users to enter the code when they sign up in the research project management system. The NTIS has also disposed the Resident Registration Number according to the implementation of the Personal Information Project Act. Instead, the Science & Technology Researcher Code is used as an identification key. Since all researchers participating in a national R&D program have the Science & Technology Researcher Code, it was used as a personal identification key in linkage of the research project management system between the NTIS

and leading agencies.

As shown in figure 1, in terms of a linkage method, after the issuance and authentication of a token, the related information (success/fail, the Science & Technology Researcher Code, application URL) is sent to the leading agencies' research project management systems in a JavaScript object notation (JSON) form in the login agent installed in the leading agencies. Then, the two systems are logged in by checking the member information of the leading agencies' research project management system and using the personal identification key-based login functions. However, researchers are able to log in normally if they have the Science & Technology Researcher Code and are currently a member of both NTIS and leading agency. If a researcher attempts to log in while his/her personal identification key (the Science & Technology Researcher Code) is not issued yet, the Science & Technology Researcher Code issuance page appears. For a non-member, a sign-up page shows up. The login linkage method is divided into the followings: i) the session information needed by the leading agencies is created in the authentication verification source to be distributed, and an application page appears, ii) move to the leading agency's automatic login page from the authentication verification source to be distributed. In addition, the login session time after the login linkage of the research project management system between the NTIS and leading agencies is completed is not related with the login linkage in this section.

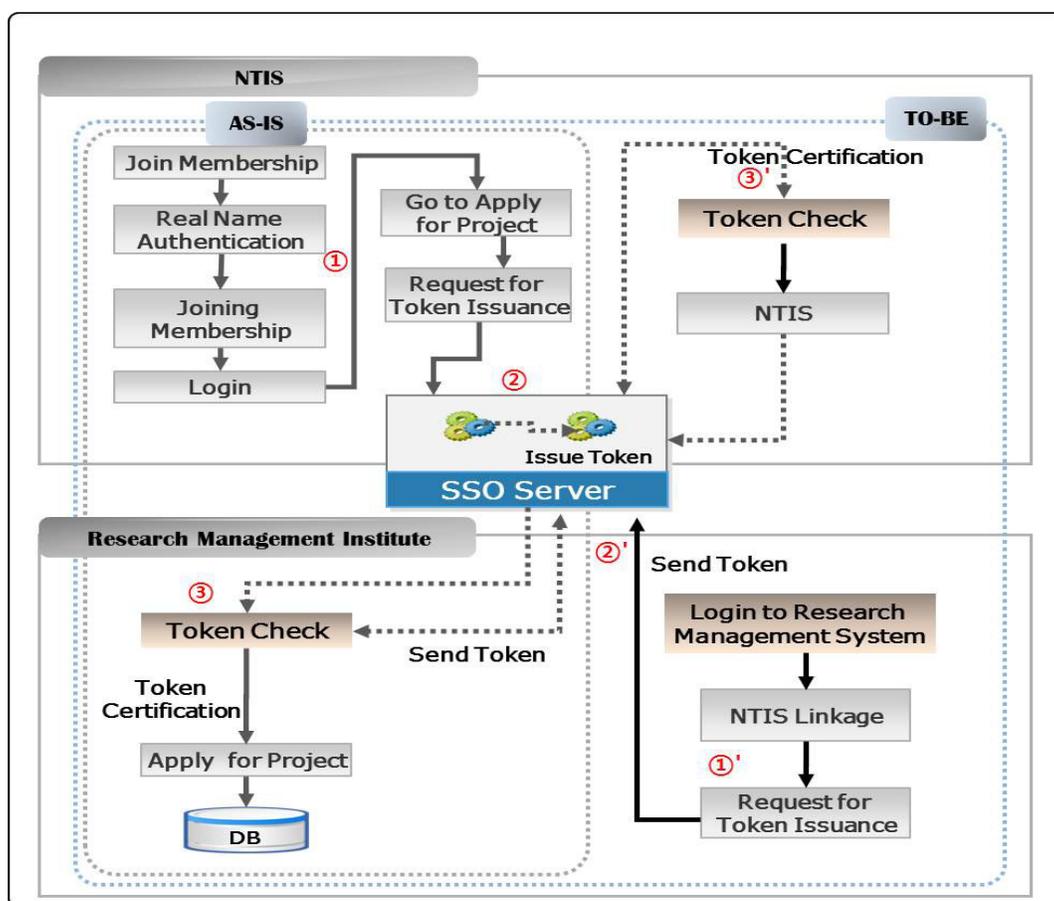


Figure 1: Flow of SSO Linkage

As shown in figure 1, the SSO linkage is designed to move to the research project management system of both NTIS and leading agencies (AS-IS). In terms of the automatic login linkage from the NTIS to the leading agencies, if [Go to the Application Page] is clicked in the NTIS' R&D Notice, the page is moved to the leading agency's system through the authentication of the login linkage server. In other words, after getting a token issued by the NTIS, the validity is confirmed. Depending on the results, then, automatic login is completed (success) in the leading agency's system SSO, or the page is moved to the leading agency's certain page (failure). For the improvement of researchers' convenience, since then, the system was improved from a one-

way to two-way system (TO-BE). If [Link the NTIS] is clicked in the leading agency's system, therefore, the page is moved to the NTIS system through the authentication of the login linkage server. In other words, validity is confirmed after getting a token issued by the leading agency's system. Depending on the results, then, automatic login is completed (success) in the NTIS' SSO, or the page is moved to the NTIS' integrated website (failure).

**B. Linkage of Project Application Information and Notice Information by the Online Project Participating Agencies**

This study provides the project notice information integrated in the NTIS to allow researchers to check the project notice information which is scattered across the leading agencies at the the same place. The NTIS has provided integrated project notice information service by linking the notice information from leading agencies in database. The linkage items include the notice number, agency code, bureau name, title of the notice, notice-related URL, name of the agency, notice details, attached file ID, date of registration, date of notice, deadline for application submission, start of application submission, closing time for application submission and application URL. The project application URLs were collected to allow researchers to move to the project application page after inquiring the project notice. Furthermore, the notice number and agency code were taken as the key to matching between project notice information project application information.

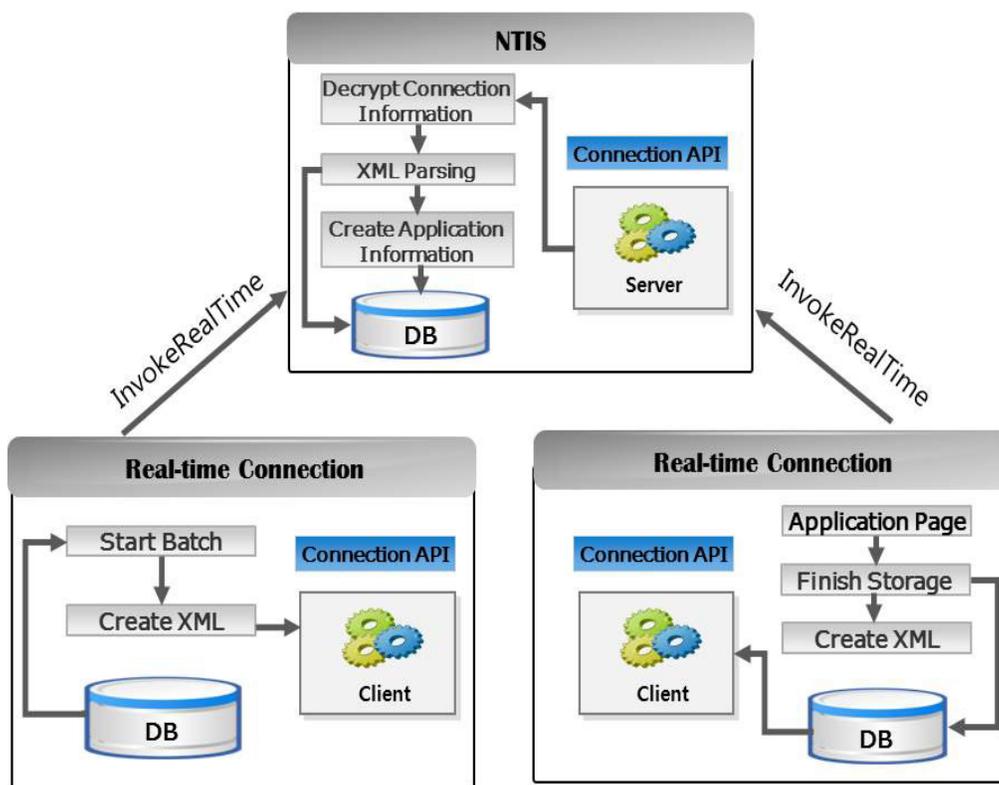


Figure 2: Linkage of API and DB

This study linked the system to make the projects applied through a single window as well as project applications editable. The project applications are edited by the leading agency while the NTIS searches the applications and provides a window for editing (Go To) for the improvement of researchers' work efficiency. To make the project application information editable (Go To), this study used the leading agency's research project management system and real time linkage (API) & database linkage method. Figure 2 shows the real time linkage data were created in an XML format and SEED-encrypted before being sent. In terms of linkage items, the notice number and agency code were linked for matching between the project notice information and application information. To make it possible to figure out which project a researcher applied for, furthermore, minimum information (e.g., project ID, project application No., title of the project applied, Science & Technology Researcher Code, senior researcher's name, project application state, date of application, deletion state, project application item, etc.) was linked.

### C. Linkage of Project Application Information and Notice Information by the Offline Project Participating Agencies

To solve researchers' inconvenience in applying for a project by mail or in person in an organization which does not have the project management system, this system permitted online project application and submission. In terms of online project application and submission, the program (submission) manager selects the target project in the NTIS' integrated R&D notice and fills out the documents such as the program plan that researchers should submit. Once the input is completed, researchers search the R&D notice and enter the project application information in the NTIS' project application page. Then, they are able to submit the application by uploading the program plan. In other words, the NTIS provides an online window for project application and submission to eliminate the inconvenience of applying for a project by mail or in person. Figure 3 shows illustrate the project application & submission process.

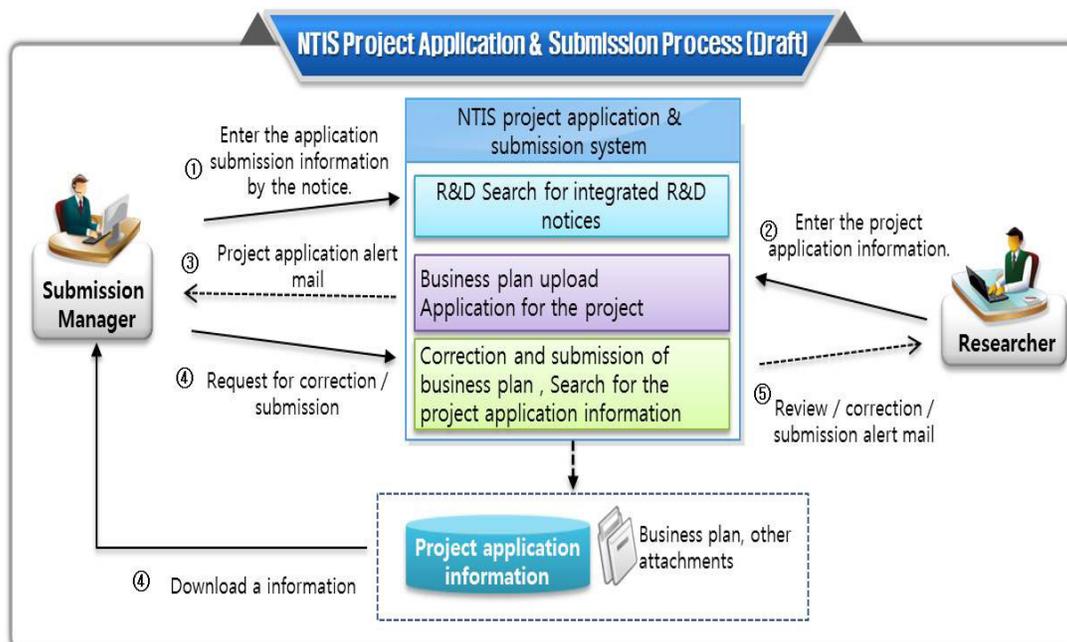


Figure 3: NTIS Project Application & Submission Process

**Step 1:** The program (submission) manager selects the program notice in the NTIS' integrated R&D notices, enters needed management information and activates the submission function.

**Step 2:** A researchers searches the integrated R&D notice and upload a program plan which has been prepared to apply for a project.

**Step 3:** Once the researcher submits the application, it is emailed (automatically) to the program (submission) manager.

**Step 4:** The program (submission) manager downloads and checks the researcher's application, has it improved if necessary, and then completes the submission process.

**Step 5:** If the program (submission) manager reviews, asks for improvement, or finishes the submission process, the result is emailed (automatically) to the researcher.

### IV. SERVICE RESULTS

Researchers are able to inquire and submit/edit an application for the national R&D project in the NTIS' national R&D program management. After scrapping the projects which have been interested or applied by researchers, they could be available when an application is submitted later. In terms of project management, furthermore, participation rates can be internally managed with the participating researchers. As a result, the process can be monitored all the time not to violate the rule (no more than 5 programs (within 3 programs in case of accountability research)).

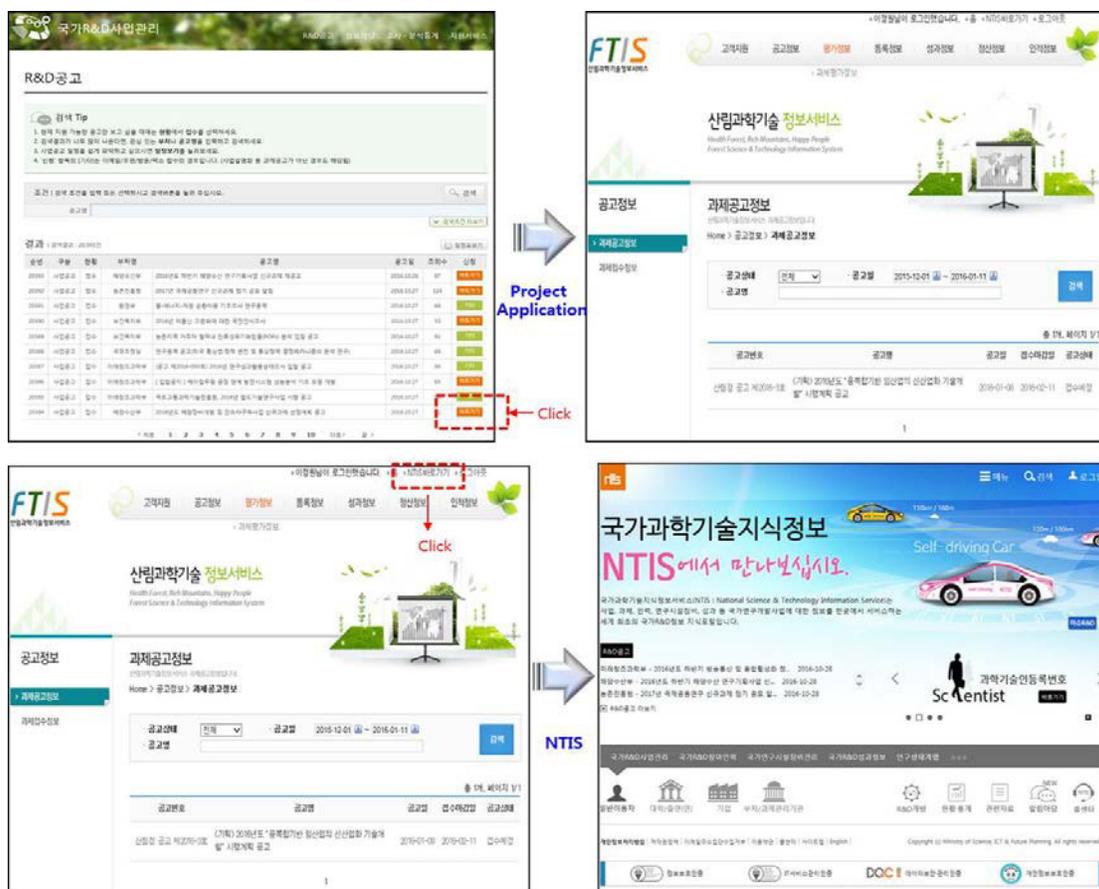


Figure 4: Service of NTIS

Figure 4 shows the inquiry of the project notices and project application page in the NTIS. Researchers are able to move from the NTIS to the leading agency and vice versa. Then, they can use the services without redundant login process between the NTIS and leading agency.

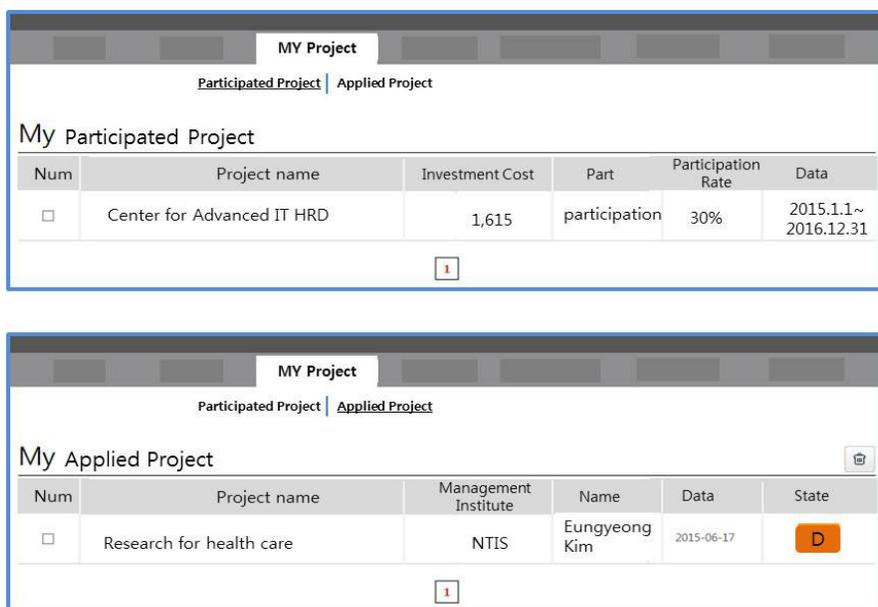


Figure 5: Management of My Project

As illustrated in Figure 5, researchers are able to inquire and manage the projects they participated and applied for in the My Project menu in the NTIS. Therefore, they can monitor and manage participating researchers, participation period and participation rates easily.

## V. CONCLUSION

At present, the NTIS provides integrated R&D project notice information services. However, researchers still need to get access to each research project management system to apply for a project. For researchers' convenience in participating in an R&D project, checking the project notices and editing their application information, a national R&D information management system has been developed. According to analysis on utilization rates (No. of logins) from January to September 2016, 2,015 logins were found from the NTIS to the leading agency while a total of 5,320 cases were observed from the leading agency to the NTIS. In other words, as the utilization rates continuously rise, it appears that more people would use the national R&D information management system. At present, 16 out of 17 leading agencies (6 agencies are scheduled by December 2016) and 2 management institutes are linked. For the convenience of researchers' convenience, it is needed to expand a linkage with the management institutes and leading agencies.

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## Exploratory Analysis of brand Images of Korea's Big-Five Companies Using the Fragrance Grid

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### Abstract---

**Background/Objectives:** This study classified ten fragrances based on arousal and cool-warm dimensions, and explored brand images of Korea's big-five companies that matched the fragrances.

**Methods/Statistical analysis:** For purposes of the present study, we conducted an experiment to classify the experimental scent along two dimensions: physiological arousal and perceived temperature. A total of 20 Korean undergraduate students with mean age = 21.65 (SD = 2.93). The average experiment duration approximated on hour for each sample.

**Findings:** The results of the present paper indicated that ten fundamental fragrances were significant and correctly classified into four groups: Cluster 1 included Jasmine, Eucalyptus, and Sandalwood; Cluster 2 included Lilac and Vanilla; Cluster 3 included Lavender, Peppermint, and Rosemary; Cluster 4 included Ylang-ylang and Orange.

**Improvements/Applications:** We proposed a Fragrance Grid that is comprised of 10 experimental scents that vary in terms of activation-relaxation and cool-warm dimensions. Finally, we found fragrances representative of Korea's big-five companies' brands that corresponded to the Fragrance Grid.

**Keywords---** Scent, Fragrance Grid, Sensory Marketing, Brand Image.

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## I. INTRODUCTION

Recently, sensory marketing using the five senses has been utilized increasingly often<sup>1</sup> and, in some sensory marketing strategies, fragrance is a most powerful method by which to attract customers. Indeed, marketers have introduced the use of unique scents to generate a comfortable atmosphere in stores. For instance, the Korean LOTTE department store uses distinctive fragrances (e.g., rose scent) on the first floor and has established a fragrance characteristic of its own brand. Additionally, BC card Co. in Korea launched a credit card that consumers can infuse with a perfume of their choosing. Unlike other sensory inputs, fragrance promptly provokes a consumer's action or facilitates more positive feelings about products and services. This is because scent perception is closely connected to the emotion-related limbic system<sup>2</sup>. Therefore, fragrance marketing can influence the perception of in-store images, mood, and atmosphere, which may result in consumers revisiting stores as well as remaining loyal customers.

Empirical research has found that fragrance may be effective for relieving tension<sup>2</sup> and for changing individuals' mood state<sup>3,4</sup>, which suggests that fragrance acts as a regulator of arousal levels in the brain. In the context of consumer behavior, fragrance can facilitate consumers' positive mood and heuristic information processing of marketing messages. Furthermore, fragrance has a positive effect on the consumer's intention to visit stores, sojourn time<sup>3</sup>, and his or her evaluation of products and stores<sup>4</sup>. In particular, responses to fragrance can vary depending on the semantic associations for a given fragrance. Semantic association indicates that fragrance is not just physically remembered; the memory also has a subjective component. A previous study found that fragrance improves evaluation of stores, intentions to visit, and the sojourn time of consumers if a masculine scent (e.g., rose maroc) is present in a menswear store or a feminine scent (e.g., vanilla) in a women's clothing store<sup>3</sup>.

Additionally, previous research considered the temperature of fragrances regarding the semantic association between a particular scent and attitudes toward the scent<sup>4</sup>. They found that positive product evaluations occurred when the perceived temperature of particular scents and the actual temperature of particular products were congruent (e.g., a cold gel-pack and a cool scent or a hot gel-pack and a warm scent).

Many studies have considered the effects of fragrance on consumer's emotions and attitudes. Empirical research has showed that fragrance has a positive effect on consumer's preferences and engenders better communication with consumers<sup>2,4</sup>. Although researchers have mapped fragrances to classify the characteristics of various scents based on the Odor Effect Diagram<sup>5</sup>, there have been no attempts to classify fragrances using a two-dimensional model of electroencephalography (as a marker of arousal) and perceived temperature of scents for marketing purposes. There is little research on the classification and typology of fragrance in the fields of consumer psychology and brand communication, despite the fact that fragrance is an important marketing tool. Therefore, here we classified fragrance's attributes and provided a visualization that intuitively displays their psychological characteristics. Furthermore, we use this fragrance map to communicate branding, by seeking representative fragrances for major Korean brands.

We classify fragrances that were selected based on the Fragrance Wheel<sup>6</sup>. We then propose a Fragrance Grid and some plausible strategies relating to brand images of five major Korean companies in terms of fragrance marketing.

## II. LITERATURE REVIEW

### A. *Psycho Physiological Attributes of Fragrance*

Research on fragrance has shown how scents influence the emotional states and working capacity of human beings. In particular, the effect of scents on affect is associated with the limbic system in the forebrain<sup>7</sup>. The limbic system, which consists of substructures such as the hippocampus, amygdala, and thalamus, is known as the paleocortex that is, it provokes affective responses.

Prior studies have demonstrated the effect of scent on brain through electroencephalography. Such studies have argued that scents are effective for relieving stress, tension, and depression. Pleasant scents facilitate positive mood because neural activity is altered by scents<sup>7</sup>. More specifically, the scent of lavender has a relaxation effect, as indicated by alpha-wave changes that represent stabilization of brain<sup>8,9</sup>, while the scent of jasmine has an arousing effect, as indicated by high beta-wave activity<sup>10,11</sup>. Similar to the scent of jasmine, scents of peppermint and rosemary trigger beta-wave activity<sup>8,12</sup>. The psychological effect of scents, especially essential oils, are used in "aromatherapy" to promote stability of mind and body or to strengthen

performance. In this paper, we attempt to measure arousal induced by scents, using electroencephalography, in order to test the levels of arousal of scents.

### **B. Effects of Fragrance on Consumer Behaviors**

As pleasant fragrance can promote positive feelings, it is used frequently for marketing. Scent marketing is available to promote a product and to build a brand image<sup>2</sup>. An empirical study showed that housewives preferred scented stockings to unscented stockings, indicating that preference for scents tends to be instinctive<sup>13</sup>. In addition, the congruency of products and scents is an important factor in sensory marketing because congruent scents, such as an orange scent and orange fruits, will have a positive effect on consumers' decision making<sup>14</sup>. Indeed, a Swedish grocery store has deployed the scent of oranges in the fruits and vegetables area. This tactic increased the sale of oranges<sup>2</sup>. Several studies have shown that fragrance that is congruent with a product can positively influence the time spent within stores<sup>15,16</sup>. Furthermore, sex-congruent ambient scents are also directly related to consumers' purchasing behaviors. Also, fragrances can positively affect when feminine scent (e.g., vanilla) was released in a women's clothing store and a masculine scent (e.g., rose maroc) in a menswear store<sup>3</sup>. They concluded that sex-congruent fragrance may contribute to improved evaluations of product price and quality, and encourage customers to remain longer and spent more money. Visitors to these stores also reported that they would like to revisit the store.

As scents have semantic associations that are learned through repeated exposure to different scents in different contexts (e.g., lemon and clean), fragrances can affect consumers' perceptions and evaluations<sup>4,17</sup>. Similar to the perceived temperature of colors (e.g., blue appears cool, and red appears warm), the perceived temperature of scents also carries semantic meanings. A previous study revealed that consumers positively evaluated products when the temperature of the fragrance and product were consistent (e.g., a cool scent and cold gel-pack or a warm scent and hot gel-pack)<sup>4</sup>.

Moreover, scent can be used in branding strategies. Many firms have used scents to represent their brand and its image. For instance, the Westin Hotel has used a scent of white tea in their hotels around the world. Hotel Westin emphasizes the brand personality through the firm's unique scent and, in turn, customers are encouraged to purchase a White Tea Collection, which includes scented candles, potpourri, and oils. Abercrombie & Fitch have used a signature scent in store and launched the scent as a product<sup>2</sup>. Our study examines how consumers perceive the temperature and image of a fragrance. Furthermore, we categorize scents based on their arousal and temperature, and then utilize this result for brand marketing.

### **C. Classification of Fragrances**

Prior studies make clear that people respond positively to pleasant scents and fragrance is utilized in many different ways. Researchers have placed fragrances (perfume materials) in a two-dimensional space, via semantic descriptors of odors<sup>18,19,20</sup>. For example, the Odor Effects Diagram was a map of scents based on two axes: Erogenous vs. Anti-erogenous and Narcotic vs. Stimulating<sup>5,21</sup>. This diagram was generated to assist those in the perfume industry to understand the physiological and emotional effects of fragrances. From the Odor Effects Diagram, many studies and companies have tried to generate a sensory map of odor descriptors for investigating the characteristics of fragrances<sup>22,23</sup>.

Fragrance Wheel was a scent map classified more than 5,700 commercial perfumes into 14 categories. Researchers analyzed numeric and semantic odor profiles by principle component analysis, and then compared the results with the Odor Effects Diagram<sup>24,25</sup>. Note that little research has focused on the classification of fragrances in the context of sensory marketing, although several studies have found that the consumer's shopping behavior can depend on specific types of fragrances<sup>13,14</sup>. As previously mentioned, a fragrance strategy is very useful to improve consumers' perceptions and purchasing behaviors<sup>2,26</sup>.

Therefore, we propose that physiological arousal and the perceived temperature of fragrances will be valid criteria by which to classify fundamental fragrances in a two-dimensional model. Furthermore, we predict that the congruence of brand image and fragrance image will suggest tactics for brand communication using scents. In this study, we measured arousal using electroencephalography (EEG) and investigated the subjective temperature of scents using face-to-face interviews. This study examined a two-dimensional (arousal and perceived temperature) scent diagram and explored the congruence effects of fragrance images and brand images for major Korean companies. More specifically, we propose a classification of fragrances (called the "Fragrance Grid") for sensory marketing, and examine the commonalities between fragrance and brand images based on the Fragrance Grid. Finally, we suggest several sensory marketing strategies that are

appropriate for the brand images of Korea’s big-five companies.

### III. METHODS

A total of 20 Korean undergraduate students (10 females, 10 males; mean age = 21.65 years, SD = 2.93) who were enrolled in introductory psychology courses voluntarily participated in this study. All participants were recruited through an announcement in the college online community.

We first selected 12 fragrances based on the Fragrance Wheel <sup>6</sup> that is widely used for scent classification. The 12 typical fragrances were jasmine, lilac, lemongrass, ylang-ylang, lavender, vanilla, sandalwood, peppermint, orange, eucalyptus, rosemary, and lime. We used 100% natural ingredients for all scents. The Korean big-five brands—Samsung, Hyundai, LG, SK, and Shinhan—were selected from The Most Valuable Brands of 2015, including corporations <sup>27</sup>.

Arousal was measured using electroencephalography (QEEG-8, LAXTHA Inc.) while participants smelled the fragrances. Data were collected from the prefrontal cortex (Fp1, Fp2), medial frontal cortex (F3, F4), inferior parietal cortex (P3, P4), and temporal cortex (T3, T4). RST (ratio of SMR to theta, i.e., 12–15 Hz divided by 4–8 Hz) was extracted from the quantitative EEG (QEEG) and used to indicate the level of physiological arousal.

In general, RST is a stable EEG-derived measure of attention/concentration <sup>28</sup>.

Measures of perceived temperature were adopted from a previous research <sup>14</sup>. This method of measuring perceived temperature employs a 7-point semantic differential scale: “In general, this fragrance is cool (0) ~ warm (6).” Participants were also asked to evaluate images of 12 experimental fragrances and corporation brands of Korea’s big-five companies.

The scale for image evaluation was adopted from a previous study, whereby participants indicated which of 25 olfactory adjectives applied: modern, active, impressive, individual, pleasant, neat, lively, light delicacy, feminine, dignified, natural, warm, antique, deep, stimulating, frivolous, refreshing, bright, comfortable, refined, romantic, gorgeous, excited, and passionate<sup>29</sup>.

We checked temperature and humidity in the laboratory before the study started. The lab was maintained at 24 ± 1 °C and 45 ± 5 % humidity <sup>30</sup>. We asked participants to remove heavy clothing or accessories so as to facilitate stably measuring EEG. In accordance with the instructions, participants were asked to maintain a comfortable posture and to not move during the experimental session. Baseline EEG for each individual in a stable state was measured for a total of 8 minutes (4 minutes with eyes open and 4 minutes with eyes closed state) <sup>31</sup>. Next, we collected EEG data in the presence of a fragrance for 20 sec. Each experimental scent was placed approximately 10 cm beneath the participant’s nose, and the participant closed his or her eyes while inhaling the fragrance <sup>32</sup>.

We counterbalanced the presentation order of all experimental scents. After one fragrance has been received (20 sec), the participant immediately completed the assessment of the perceived temperature and image of the fragrance (1 min 40 sec).

While completing these questions, we opened the lab windows to allow the odor to dissipate and provided a 5-minute break to address potential fatigue and declining sensitivity. The experiment consisted of 3 sessions, with 4 fragrances presented per section. In the final session, participants were asked to complete a survey of brand images of Korea’s big-five corporations. When all sessions were finished, participants received monetary compensation of 10,000 Korean Won. The average experiment duration approximated one hour for each sample (c. 47 minutes for three experimental sessions and 15 minutes for device preparation). Table 1 represents the experimental stimuli and timing of our study.

Table 1: Experimental Stimuli and Timing

Relaxation Session	Session 1	Break	Session 2	Break	Session 3	Termination Session
Baseline	Jasmine Lilac Lemongrass Ylang-ylang	-	Lavender Vanilla Sandalwood Peppermint	-	Orange Eucalyptus Rosemary Lime	Brand images survey
8 min	8 min	5 min	8 min	5 min	8 min	5 min

#### IV. RESULTS

Therefore, we propose that physiological arousal and the perceived temperature of fragrances will be valid criteria by which Cluster analysis was used to classify the experimental scents along two dimensions: physiological arousal and perceived temperature. We conducted analysis of only 10 fragrances. Lemongrass and lime scents were excluded because these two scents could not be reasonably classified on the two dimensions; mean ratings of arousal and temperature for both scents approximated zero.

As shown in Table 2, four groups were significantly classified ( $F_{arousal}= 48.291, p < .01; F_{temperature}= 6.325, p < .05$ ), using standardized values of arousal and temperature. Although cluster analysis showed somewhat different results than we initially predicted, the 10 experimental scents were reasonably classified, per the solid line in Figure 1; dotted lines indicate the initial prediction on the basis of quadrants, based on previous studies. The first cluster comprised jasmine, eucalyptus, and sandalwood; the second cluster, lilac and vanilla; the third lavender, peppermint, and rosemary; and the fourth cluster ylang-ylang and orange.

Consistent with our aim, we mapped the Fragrance Grid based on four clusters of ten scents. The Fragrance Grid in our study was comprised of 10 fundamental scents that varied along two dimensions: activation-relaxation and cool-warm.

Based on the results of the cluster analysis, we proposed a model fragrance classification for sensory marketing. As shown in Figure 2, scents considered cool in temperature included rosemary, peppermint, lavender, sandalwood, and eucalyptus; those considered warm in temperature included jasmine, lilac, vanilla, ylang-ylang, and orange.

Interestingly, our model suggests that the temperature of a fragrance may effectively combine levels of arousal. For example, the scent of lilac represents a high level of arousal (i.e., activation) and a warm temperature, while rosemary reflects a low level of arousal (i.e., relaxation) and a cool temperature.

Table 2: Results of cluster analysis

Dimensions	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Arousal	1.440	-.058	-.480	-1.323
Perceived temperature	-.173	.737	-1.243	.650
Fragrance	Jasmine Eucalyptus Sandalwood	Lilac Vanilla	Lavender Peppermint Rosemary	Ylang-ylang Orange

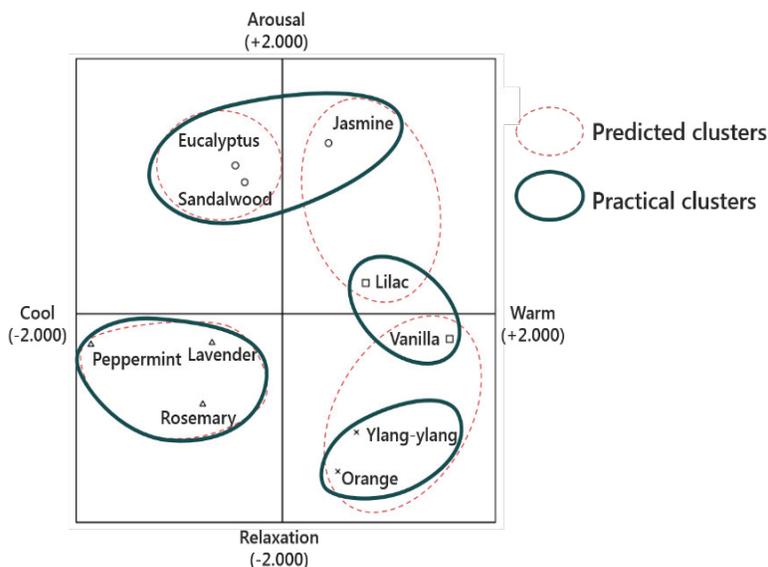


Figure 1: Comparison between predicted and practical clusters

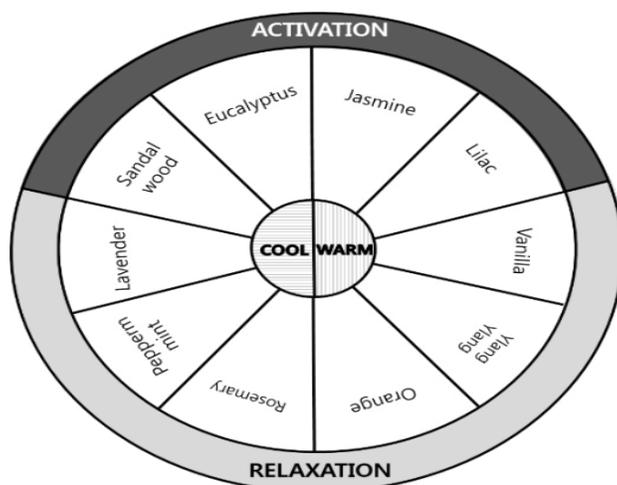


Figure 2: Fragrance Grid

Furthermore, we sought the best images of major Korean brands through a matching technique that extracted common characteristics of fragrance and company image. Given that representative images between companies and fragrances are matched, we propose crucial strategies for brand communication to improve corporate image based on the matched fragrances in our model. To identify matched fragrances and major Korean companies, we ranked the mean scores for brands and fragrances for each adjective scale (i.e., image) and then selected the top-ranked fragrances and brands. Our results indicated that the Korean big-five brands had representative images and typical fragrances corresponded to each brand's image. As shown Table 3, Samsung Co. was considered active, elegant, and modern, and typical matched fragrances were orange, ylang-ylang, and lilac. Hyundai Co. was considered to have a deep, exciting, and stimulating image, and rosemary, peppermint, and eucalyptus represented Hyundai's fragrances. Consumers thought that LG Corp. represented a delicate, comfortable, and natural brand, and consequently, the representative fragrances for LG Corp. included lilac, vanilla, and orange. The representative fragrances for SK Co. were rosemary, orange, and jasmine because SK Co. reflected a corporate image of impressive, bright, and gorgeous brands. In contrast, because Shinhan Co. was evaluated as refined and neat, representative fragrances included ylang-ylang and peppermint. These findings suggest that corporation brands may properly correspond with typical fragrances located on the Fragrance Grid, i.e. fragrances positioned in terms of activation versus relaxation and cool versus warm (Figure 2).

Table 3: Results of Matching Brands Images with Fragrances Images

Brands	Images	Fragrances	Fragrance Grid		Cluster
Samsung Co.	Active/	Orange	Relaxation	Warm	Cluster 4
	Elegant	Ylang-ylang			
	Modern	Lilac	Activation	Warm	
Hyundai Co.	Deep/	Rosemary	Relaxation	Cool	Cluster 3
	Excited	Peppermint			
	Stimulating	Eucalyptus	Activation	Cool	
LG Corp.	Delicacy	Lilac	Medium/	Warm	Cluster 2
	Comfortable	Vanilla			
	Natural	Orange	Relaxation	Warm	
SK Co.	Impressive	Rosemary	Relaxation	Cool	Cluster 3
	Bright	Orange	Relaxation	Warm	Cluster 4
	Gorgeous	Jasmine	Activation	Warm	Cluster 1
Shinhan Co.	Refined	Ylang-ylang	Relaxation	Warm	Cluster 4
	Neat	Peppermint	Relaxation	Cool	Cluster 3

## V. CONCLUSION

We explored a classification of odors into a two-dimensional "Fragrance Grid" and then links characteristics of test fragrances with images of major Korean brands. In particular, present study was to assist sensory marketing by classifying typical fragrances in terms of physiological arousal and perceived temperature and proposing a Fragrance Grid for brand communication. We conducted cluster analysis to classify attributes of fragrances based on the two dimensions of arousal and perceived temperature. Further, we explored representative fragrances for Korea's big-five companies by matching the brand and fragrance images.

Our results revealed a reasonable model of fragrance classification based on physiological arousal (activation/relaxation) and perceived temperature (cool/warm). Additionally, we found that the major Korean brands have representative images that match typical fragrances within our Fragrance Grid model.

Our findings showed that the Fragrance Grid has potential benefits if marketers want to use scents in sensory marketing. That is, marketing practitioners may introduce our Fragrance Grid model to perform effective brand communications. For example, if marketers aim to engender feelings of relaxation and warmth in consumers, they could use ylang-ylang; or, if they wish to promote arousal and feelings of cool, they can use eucalyptus.

Marketers can also use this new model to improve the image of corporation brands. Interestingly, we found that Samsung, Hyundai, and LG had unique, representative images, but SK and Shinhan Co. did not. Based on these results, the companies can utilize fragrance for changing or building corporation brand images, if they need to do so. For example, Samsung Co. could use a vanilla fragrance if Samsung needs to change their current image to be deeply comfortable. Further, Samsung could choose vanilla fragrance, which is included in Cluster 2, with a lilac fragrance to convey warmth or a modern and comfortable image to consumers, consistent with the Fragrance Grid in our study. In contrast, Hyundai Co. could use a jasmine fragrance and a eucalyptus fragrance, which are included in Cluster 1, together if Hyundai wants to generate stimulating and gorgeous images and activation for the consumer. LG Corp. may introduce the scent of orange to change the firm's current natural image, because orange scents represent feelings of brightness.

Unlike the aforementioned companies, our results showed that SK and Shinhan Co. did not have representative or typical brand images based on the Fragrance Grid. Thus, they may apply fragrances to build unique brand images; SK may use peppermint fragrances with rosemary, which fall in Cluster 3, to convey relaxation and cool, thus establishing new brand images characterized by neat feelings. Shinhan Co. may try to adopt the scent of orange, which is included in Cluster 4, with ylang-ylang to convey relaxation and warmth to consumers that would build new brand images of naturalism or brightness.

Our results imply that the Fragrance Grid, which consists of arousal and perceived temperature dimensions, provides a valid approach to fragrance classification and is available to use in sensory marketing to build or develop brand images. Therefore, we expect that the results of this study will provide suitable guidelines for brand communications using sensory marketing strategies. Nevertheless, the sample size in this study was small because of the issues relating to measuring EEG signals, and thus further research should utilize larger samples to facilitate generalization. Second, although the measurement of perceived temperature was adopted from a single item, using multiple scales to assess temperature may be of utility to validate our measures and the interpretation of our study findings.

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# A Study on the Relationship between the Organizational Commitment and Intention of Implementation of Internal Employees in Professional Sport Team on the Type of CSR Activities

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## Abstract---

**Background/Objectives:** The purpose of this study is to establish effective implementation plans of professional sport clubs for social responsibility activities by determining the type of CSR activities actually implemented by professional sport clubs and the relationship between organizational commitment and intention of implementation.

**Methods/Statistical Analysis:** For such purpose, the survey targeting 240 officials from professional sport (baseball, soccer, basketball, volleyball) clubs was carried out using the convenient sampling method. The confirmatory factor analysis, Cronbach's  $\alpha$ , correlation analysis and structural equation model (SEM) analysis were carried out using the SPSS 20.0 and AMOS 20.0 programs for data analysis.

**Findings:** The investigation result is as follows. First, it was discovered that the protection of fans' rights and interests among the types of social responsibility activities of professional sport clubs had a significant influence on the organizational commitment. Second, it was discovered that the organizational commitment had a significant influence on the intention of implementation.

**Improvements/Applications:** Reinforcement of commitment among members towards an organization increases the degree of practice for CSR activities while enhancing the image of team and representing reciprocal attitude to consumers by strategically exposing them.

**Keywords---** Professional Sport Team, CSR, Type of CSR Activities, Organizational Commitment, Practicing Intention.

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## I. INTRODUCTION

As it is no longer a period to evaluate the company only with sales and brand power, corporate social responsibility (hereinafter referred to as "CSR") has been serving as an important role to be a criterion measuring social value of the company as well as significant mind-set that corporate was required to equipped<sup>1</sup>.

Implemented upon external pressure and request in the past, CSR has been serving as a traditional role for creating profit due to emergence of smart customers who were interested in ethical management along with recognition of importance for sustainable management after global economic recession and unstable financial market<sup>2,3</sup> as well as other various roles including ethics, charity, and environment<sup>4</sup>. In addition, CSR has been recognized as an essential element of society-oriented managerial activities to meet the needs of the times instead of choices made by corporate<sup>5</sup>.

Professional sport teams in Korea are currently in a competing situation due to changes in internationalization of sports and complicated changes in the market circumstances<sup>6</sup>. Therefore, there has been an increasing concern and participation in CSR.

On the researches in classification of CSR activities in the field of sports,<sup>7, 8</sup> have classified CSR activities in a single dimension.<sup>9</sup> have classified CSR activities into economic responsibility and social contributing activities.<sup>10</sup> have classified CSR activities into local community contributing activities and fan-protecting activities.<sup>11</sup> have classified CSR activities into team event-related activities, donating activities, amateur player supporting activities, and donating activities for the needy.<sup>12</sup> have classified CSR activities into legal, economic, and ethical responsibilities and social contributing activities. In the previous studies, one of the constructs among CSR recognition in a single dimension and CSR activity types was applied, or abstract concept and detailed concept were mixed and used together. There has been insufficient research that classified CSR activities performed by professional sport teams according to types.

It can be defined that the CSR activities of enterprises combine the implementation and value of enterprises by reflecting the interested parties' interest as well as all interested parties including customers, employees and environments<sup>13</sup>.

This indicates the management in consideration of interests with various interested parties, and understanding and efficient management of internal employees who accept and implement such activities along with consumer exposure and satisfaction of local communities are important<sup>14, 15</sup>.

The precedent studies regarding the CSR activities of enterprises in the general field have been carried out by focusing on the marketing performances such as consumers' belief, brand image, loyalty and intention of purchase based on the consumers who are external interested parties<sup>16, 17, 18, 19, 20</sup>.

However, the relevant studies have ben emphasized recently according to the recognition of its importance that the CSR activities give a positive influence to internal employees, improving the organizational performance, so more studies regarding the organizational behavior of internal employees such as organizational trust <sup>21,5,22</sup>, organizational commitment <sup>22,23,24</sup> organizational citizenship behavior<sup>25</sup>, loyalty<sup>26</sup> are being carried out.

However, most of the researches in dealing with CSR activities in the field of sports have been conducted on consumers as external interested parties while focusing only on consumers including recognitio<sup>8</sup>, appropriateness<sup>27</sup>, team image<sup>7</sup>, and sponsorship<sup>28</sup>.

Therefore, the purpose of this study is to determine the contents of CSR activities actually implemented by professional sport clubs, classify the types according to the characteristics and verify

the relationship between the type of CSR activities, organizational commitment (loyalty, spontaneity, acceptance of values) and intention of implementation of professional sport clubs targeting club officials who are internal interested parties, and to contribute to the establishment of effective CSR activity implementation plans in future for professional sport clubs by determining the types of CSR activity that could have a positive influence on professional sport clubs.

## **II. STUDY METHODS**

### ***Study Subjects***

In this study, the investigation was carried out targeting 279 officials from 32 professional sport clubs (8 basketball clubs, 9 volleyball clubs, 5 baseball clubs, 10 soccer clubs) out of 51 professional sport clubs (basketball, volleyball, baseball, soccer) from February 2015 to September 2015. The samples were collected using the convenience sampling method, and 240 questionnaires except for 39 questionnaires considered responded insincerely such as no filling out, duplicated filling out and consistent marking from entire samples were used for the analysis. The data collection in this study was carried out together with a study conducted by Kim et al.<sup>29</sup>.

### ***Research Tool***

The investigation tool used in this study was the questionnaire, and the draft questionnaire was prepared based on the investigation on the expert group, and then it was completed and used after carrying out the preliminary investigation.

The self-administration method was used for the questionnaire.

For the protection of fans' rights and interests among the type of social responsibility activity, survey questions of Kim<sup>30</sup> and consumer protection-related questions of Yoon et al.<sup>31</sup> and Heo<sup>32</sup> were modified and used according to the context, and for cultural business in the hometown, local culture project activities-related questions of Kim<sup>30</sup>, Kim et al.<sup>33</sup>, Yoon et al.<sup>31</sup>, Cho<sup>34</sup> and Heo<sup>32</sup> were modified and used according to the context. For public interest-linked marketing, social contribution-related survey questions of Kim et al.<sup>33</sup>, Lee<sup>35</sup> and Heo<sup>32</sup> were modified and used, and for social charity-related questions, social cultural capital and social overhead capital-related questions of Park<sup>36</sup> and Bae<sup>37</sup> were modified and used according to the relevant study.

For the organizational commitment questions, the questions used in the study conducted by Kim<sup>38</sup> were modified and used according to the context of this study based on the questionnaire developed by 4 professors including Mowday, Porter, Steers and Boulian in order to measure organizational commitment, and for intention of implementation-related questions, the questions used by Jung<sup>39</sup> and Bang<sup>40</sup> were modified and used according to the context of this study.

### ***Validity and Reliability of Survey Tools***

As a result of confirmatory factor analysis for each factor to review the validity and reliability of investigation tool, the goodness of fit was  $\chi^2=866.461$ (df=309,  $p<.001$ ), indicating that it was unfit. However, it was confirmed that it satisfied the standard of goodness of fit (CFI, TLI over .8-.9, RMR less than .05-.08) presented by Bagozziet al.<sup>41</sup>.

According to the factor loading, all factors were over .50, satisfying the standards, and the statistical significance (C.R.>1.965,  $p<.05$ ) also satisfies the standards, securing the convergent validity<sup>42,43</sup>. (Table 1)

Table 1: Confirmatory Factor Analysis and Reliability

Factor	Question	S.C.	S.E.	E.V.	t	CR	AVE	Cronbach's $\alpha$
Fan rights	A1	.712		.270		.950	.791	.922
	A2	.811	.104	.232	12.189***			
	A3	.813	.098	.204	12.214***			
	A4	.923	.103	.097	13.814***			
	A5	.908	.104	.120	13.606***			
Regional culture	B1	.614		.426		.914	.684	.870
	B2	.839	.133	.193	10.061***			
	B3	.813	.134	.231	9.860***			
	B4	.804	.132	.234	9.787***			
	B5	.736	.121	.271	9.206***			
Cause-related marketing	C1	.845		.226		.951	.794	.940
	C2	.858	.060	.209	17.114***			
	C3	.918	.056	.124	19.305***			
	C4	.896	.061	.173	18.493***			
	C5	.839	.063	.255	16.465***			
Philanthropy	D1	.660		.440		.879	.648	.830
	D3	.823	.112	.227	10.518***			
	D4	.813	.108	.221	10.430***			
	D5	.708	.108	.349	9.376***			
Commitment	E1	.785		.142		.938	.835	.857
	E2	.900	.087	.074	13.442***			
	E3	.774	.089	.184	12.307***			
Practicing intention	F1	.883		.151		.970	.865	.954
	F2	.834	.050	.181	17.732***			
	F3	.943	.045	.075	23.365***			
	F4	.934	.045	.081	22.867***			
	F5	.899	.051	.141	20.827***			

$\chi^2=866.461(df=309, p<.001)$ , CFI=.897, TLI=.882, RMR=.042(SRMR=.0659), RMSEA=.087

\*\*\*p <.001

In order to confirm the discriminant validity between each factor, the correlation was analyzed, and the AVE (average variance extracted) index calculated between each factor was higher than the square of correlation coefficient, securing the discriminant validity. As a result of calculating Cronbach's  $\alpha$  in order to examine the internal consistency of survey questions, it was .830~.954, indicating that the survey questions were reliable<sup>44, 45</sup>.(Table 2)

Table 2: Correlation between Individual Factors

	Fan rights	Regional culture	Cause-related marketing	Philanthropy	Commitment	Practicing intention
Fan rights	.791 <sup>1)</sup>					
Regional culture	.226**	.684 <sup>1)</sup>				
Cause-related marketing	.139*	.620**	.794 <sup>1)</sup>			
Philanthropy	.229**	.645**	.616**	.648 <sup>1)</sup>		
Commitment	.421**	.206**	.187**	.219**	.835 <sup>1)</sup>	
Practicing intention	.177**	.404**	.149*	.216**	.213**	.865 <sup>1)</sup>

<sup>1)</sup>AVE

\*\*p < .01, \*p < .05

### III. RESULTS

As a result of carrying out the goodness of fit verification on the study model configured based on the theoretical basis, the goodness of fit was  $\chi^2=902.272$  (df=313, p<.001), indicating that it was unfit. However, it was confirmed that it satisfied the standard of goodness of fit (CFI, TLI over .8-.9, RMR less than .05-.08) presented by Bagozzi et al.<sup>41</sup>.(Table 3)

Table 3: Results of Verification for Appropriateness in Research Model

$\chi^2$	df	P	CFI	TLI	rmr	RMSEA
902.272	313	<.001	.891	.877	.067	.089

As a result of carrying out empirical analysis on hypothesis 1 in the relationship between the type of social responsibility activity and organizational commitment, the standardized coefficient was .413 and t value was 5.533, showing a significant difference so that hypothesis 1 asserting that 'Protection of fans' rights and interests will have an influence on organizational commitment' was supported, but in the analysis result on hypothesis 2, the standardized coefficient was .042 and t value was .372, showing no significant difference so that hypothesis 2 asserting that 'Cultural business in the hometown will have an influence on organizational commitment' was rejected.

In the analysis result on hypothesis 3, the standardized coefficient was .116 and t value was 1.161, showing no significant difference so that hypothesis 3 asserting that 'Public interest-linked marketing will have an influence on organizational commitment' was rejected, and in the analysis result on hypothesis 4, the standardized coefficient was .429 and t value was .668, showing no significant difference so that hypothesis 4 asserting that 'Social charities will have an influence on organizational commitment' was rejected.

In the analysis result on hypothesis 5 in the relationship between organizational commitment and intention of implementation, the standardized coefficient was .219 and t value was 3.123, showing a significant difference so that hypothesis 5 asserting that 'organizational commitment will have an influence on intention of implementation' was supported.(Table 4)

Table 4: Results of Hypothesis Verification

Hypothesis	Path Analysis	S.C.	S.E.	t	sig.	remark
H1	Fan rights → Organizational commitment	.413	.068	5.533	.001	accept
H2	Regional culture → practicing intention	.042	.107	.372	.710	reject
H3	Cause-related marketing → practicing intention	.116	.063	1.161	.246	reject
H4	Philanthropy → practicing intention	.051	.097	.429	.668	reject
H5	organizational commitment → practicing intention	.219	.107	3.123	.002	accept

#### IV. DISCUSSION AND CONCLUSION

The objective of this study is to clarify the relationship among types of CSR in professional sport team, commitment of members in the organization, and practicing intention. Discussion and conclusion based on the results of study are as follows.

First of all, only the protection of rights and interests among CSR types of professional team turned out to positively influence on commitment of members in the organization. Fans can be of a very important reason to operate the team and hence are regarded as high performance consumers. Seen in this perspective, it can be assumed that members in the team place the highest priority in CSR activities towards the fans among all the CSR types in the team. In addition, the more the value is granted on contributing activities for fans, the higher the commitment of members turns out to be for the team. Therefore, professional sport team is required to create various activities to protect rights and interests of fans and focus on active advertisement activities on members of the team.

Secondly, commitment of members from the professional sport team towards an organization turned out to positively influence on practicing intention of CSR activities. Such results mean that the higher the loyalty, spontaneity, and acceptance of value are among members towards an organization, the more they are willing to participate in CSR activities. Therefore, professional sport team is needed to implement various welfare strategies for reinforcing commitment of members towards an organization in order to come up with positive effect through CSR activities. In addition, in previous study have derived the results of research that the higher the commitment of members in the public sport team was towards an organization, the lower the turnover turned out to be. In other words, turnover is a type of dissatisfied attitude of members in an organization and hence can be interpreted that the higher the commitment of them towards an organization is, the more it reduces negative attitudes of members. Therefore, reinforcement of commitment among members towards an organization increases the degree of practice for CSR activities while enhancing the image of team and representing reciprocal attitude to consumers by strategically exposing them.

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## A Study on the Analysis of Club Officials' Intention of Continuous Implementation According to the CSR (Levels and Types) of Professional Sport Team

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### Abstract:

**Background/Objectives:** The purpose of this study is to analyze whether professional sport club officials participate in the corporate social responsibility (CSR) continuously according to the CSR levels and types or not.

**Methods/Statistical Analysis:** For such purpose, the survey was carried out by selecting 240 professional club officials in 4 sports (basketball, volleyball, baseball, soccer) through the convenience sampling method. In order to analyze data in the collected questionnaires, the frequency analysis, confirmatory factor analysis (CFA), reliability analysis, correlation analysis and structural equation model (SEM) analysis were carried out using the SPSS 20.0 Version and AMOS 20.0 Version programs. The investigation result is as follows.

**Findings:** First, economic and philanthropic responsibilities among corporate social responsibility levels had an influence on the intention of implementation. Second, cultural business in the hometown among the types of corporate social responsibility had an influence on the intention of implementation.

**Improvements/Applications:** the professional sport club requires a strategic approach to obtain the benefit and public interest from the internal members and external consumers at the same time.

**Keywords---** CSR, Professional Sport Team, Implementation, Cause-Related Marketing, Philanthropy.

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## I. INTRODUCTION

The corporate social responsibility(CSR)enables supplementation of aspects considered as negative in the corporate management in modern society that is operated based on competition and market. It also includes economic and legal responsibilities as well as ethical, social and environmental responsibilities required and expected continuously in the international society, playing many important roles in the management in modern society<sup>1</sup>.

According to the social identity theory, the CSR affects the attitude or behavior of organizational members through their emotional pride that they identify themselves as the organization<sup>2 3 4</sup>. Also, the members who provide service in an organization where they are rated positively are proud of themselves by identifying themselves as the organization and such attitude is linked to the members of the organization which is recognized positively<sup>4</sup>.In the end, it can be considered that they are identified as the organization through their strong emotional bond on the organization as the members of such organization.

The previous studies regarding the CSR mainly focused on external responses, and there has been lack of studies targeting the internal employees. It's because enterprises including the CSR in their management activities have focused on external performances that could obtain trust and favorable evaluation from external stakeholders such as the government, local communities, non-governmental organizations and consumers.

The reason why a study targeting internal employees of enterprises carrying out their CSR unlike the previous studies is necessary is that even if enterprises expect a positive result and carry out their management strategies in the execution of their CSR, it is difficult to obtain the expected results in case the internal employees have a negative perception on CSR activities<sup>5</sup>.

Therefore, the purpose of this study is to find specific measures to carry out the CSR through active participation and practice of club officials, not to consider the CSR activities carried out by professional sport clubs only in terms of external performance.

## II. RESEARCH METHOD

### A. Subject of Study

The internal employees of the professional sport clubs in 4 sports (baseball, soccer, basketball, volleyball) in Korea were selected as the subject of this study, and this study was carried out targeting 279 club officials from February 2015 to September 2015. The samples were collected using the convenience sampling method, and 240 questionnaires except for 39 questionnaires considered responded insincerely such as no filling out, duplicated filling out and consistent marking from entire samples were used for the analysis. Also, the data collection in this study was carried out together with a study conducted by Il-Gwang Kim, Ji-Hyun Lee and Joo-Young Kim<sup>6</sup>.The demographic characteristics are as shown in Table 1 below.(Table 1)

Table 1: Demographic Characteristics

Characteristic	Response	Frequency(n)	Ration(%)
Gender	Male	188	78.3
	Female	52	21.7
Age	20s	51	21.3
	30s	123	51.3
	40s	55	22.9
	50s or over	11	4.6
	3 years or under	81	33.8
Working Career	3 years to 6 years	62	25.8
	6 years to 9 years	29	12.1
	9 years to 12 years	29	12.1
	12 years to 15 years	16	6.7
	15 years or over	23	9.6
Sport Entry	Basketball	37	15.4
	Volleyball	41	17.1
	Baseball	79	32.9
	Football	83	34.6
Experience in Social Contribution Activity Participation	Yes	210	87.5
	No	30	12.5
Working Experience in Social Contribution Activity Related Department	Yes	82	34.2
	No	158	65.8
Total		240	100

### B. Research Tool

A questionnaire was used as a research tool in this study, and it consisted of 7 questions on the demography, 5 questions for CSR level on economic responsibility, legal responsibility, ethical responsibility and philanthropic responsibility each and 4 questions on environmental responsibility. Also, the CSR type consisted of 5 questions on the protection of fans' rights and interests, cultural business in the hometown, public interest-linked marketing and social charities each.

4 levels including economic, legal, ethical, philanthropic levels among the CSR levels were re-organized through 4 levels shown in the study conducted by Carroll <sup>7</sup> and the contents of environmental protection-related survey questions of Carroll <sup>7</sup>, Herpen, Joost& Matthew <sup>8</sup>, Lafferty & Goldsmith <sup>9</sup> adapted by Hae-Ryung Kim, Gwang-HeeYoo, Na-Min Kim and Mun-Gyu Lee <sup>10</sup> and the contents from the studies of Dahlsrud <sup>11</sup> and Swaen & Chumpitaz <sup>12</sup> adapted by Hyun-Jeong Park <sup>13</sup> were modified and used for the environmental level.

Among the CSR types, the survey questions of Young-ja Kim <sup>14</sup> for the protection of fans' rights and interests, the survey questions of Hae-Ryung Kim, Gwang-HeeYoo, Na-Min Kim and Mun-gyu, Lee <sup>10</sup> and Yoon-Seong Cho <sup>15</sup> for the cultural business in the hometown, the survey questions of KyunHeo <sup>16</sup> for regional cultural business activities, the survey questions of Hae-Ryung Kim, Gwang-HeeYoo, Na-Min Kim and Mun-Gyu Lee <sup>10</sup> and Hyun-Ok Lee <sup>17</sup> for the cause-related marketing and the survey questions of Myung-Geol Park <sup>18</sup> for the social charities were modified, supplemented and used. Lastly, the survey questions of Yong-GakJeong <sup>19</sup> for the intention of implementation were modified and used along with the context of this study.

**C. Validity and Reliability of Survey Tools**

A questionnaire In order to secure the validity of questionnaire prepared for this study, an expert group consisting of 2 professors in sports business major, 2 doctors of sports industry management major and 2 club officials was organized. Through this group, the validity of contents in the questionnaire was secured, and the Confirmatory Factor Analysis (CFA) and reliability analysis were carried out as shown in <Table 2> based on the collected questionnaire data using SPSS 20.0 version and AMOS 20.0 version.(Table 2)

Table 2: The Confirmatory Factor Analysis and Reliability of Whole Concept

Factor	Question	S.C.	S.E.	E.V.	C.R.	CR	AVE	Cronbach'sa
Economic	A1	.764		.316		.855	.749	.818
	A2	.913	.121	.160	11.104***			
Legal	B1	.801		.204		.935	.742	.893
	B2	.787	.070	.202	13.538***			
	B3	.850	.074	.173	15.031***			
	B4	.791	.084	.285	13.637***			
	B5	.748	.072	.238	12.677***			
Ethical	C1	.832		.214		.916	.687	.864
	C2	.707	.069	.333	12.052***			
	C3	.823	.062	.198	14.864***			
	C4	.706	.062	.273	12.029***			
	C5	.665	.059	.264	11.110***			
Philanthropic	D1	.626		.375		.920	.699	.888
	D2	.767	.130	.277	9.852***			
	D3	.880	.147	.179	10.854***			
	D4	.874	.154	.207	10.809***			
	D5	.770	.137	.303	9.888***			
Environmental	E1	.854		.272		.943	.805	.942
	E2	.901	.054	.184	19.143***			
	E3	.923	.052	.140	20.054***			
	E4	.904	.055	.182	19.270***			
Fanrights	F1	.710		.271		.949	.791	.922
	F2	.809	.104	.235	12.147***			
	F3	.808	.098	.209	12.130***			
	F4	.923	.103	.098	13.808***			
	F5	.913	.105	.113	13.673***			
Regional Cultural Project	G1	.647		.397		.915	.684	.870
	G2	.822	.116	.211	10.668***			
	G3	.797	.118	.248	10.419***			
	G4	.801	.117	.238	10.453***			
	G5	.750	.109	.259	9.928***			
Cause-related Marketing	H1	.851		.218		.951	.794	.940
	H2	.863	.058	.204	17.507***			
	H3	.918	.055	.124	19.660***			
	H4	.891	.059	.181	18.591***			
	H5	.835	.062	.261	16.549***			
Social Philanthropy	I2	.652		.449		.879	.647	.830
	I3	.824	.115	.226	10.413***			
	I4	.813	.110	.221	10.321***			
	I5	.714	.111	.343	9.352***			
	I1	.883		.151				
Implementation	J1	.883		.151		.970	.865	.954
	J2	.833	.049	.181	17.741***			
	J3	.944	.045	.073	23.487***			
	J4	.933	.045	.082	22.818***			
	J5	.898	.051	.142	20.803***			

χ<sup>2</sup>=2213.209(df=900, p<.001), CFI=.862, TLI=.848, SRMR=.0692, RMSEA=.087  
 \*\*\*p <.001

As a result of carrying out the confirmatory factor analysis (CFA) in order to determine the suitability for the single factor of social responsibility (CSR) level and type and the factor between each variable,  $\chi^2=2213.209(df=900, p<.001)$  was shown based on the suitability. CFI was .862 and TLI was .848, corresponding to the standards of .8~.9 or higher presented by Bagozzi& Yi <sup>20</sup>, and the SMSR value was .0692 which was below .1 and there was no problem in the suitability standard.

According to the factor loading, 5 levels were shown as 7.64-.913 for economic responsibility, .748-.850 for legal responsibility, .665-.832 for ethical responsibility, .626-.880 for philanthropic responsibility and .854-.923 for environmental responsibility. 4 types were shown as .710-.923 for protection of fans' rights and interests, .647-.822 for cultural business in the hometown, .835-.918 for public interest-linked marketing and .652-.824 for social charities, indicating that the result of all factors is higher than .50, satisfying the standards<sup>21</sup>. The intention of implementation was .833-.944, also satisfying the standards. The construct reliability of 5 levels was .855-.943 and the construct reliability of 4 types was .879-.951. In addition, the construct reliability of intention of implementation was .970.

As a result of examining Cronbach's  $\alpha$  to measure the reliability of questions in the investigation tool for the study, it was .818-.954, verifying the reliability.

### III. RESEARCH RESULT

#### A. Suitability Verification of Research Model

As a result of verifying the structural equation model for the effects of social responsibility (CSR) level and type on the intention of implementation,  $\chi^2=554.136(df=179, p<.001)$  was shown as shown in <Table 3> and CFI=.818, TLI=.882 and RMSEA=.087, verifying the suitability of this research mode.(Table 3)

Table 3: The Confirmatory Factor Analysis and Reliability of Whole Concept

$\chi^2$	df	P	CFI	TLI	RMSEA
554.136	179	<.001	.818	.882	.087

#### B. Results

The analysis result of path between each factor to see the influence of the CSR levels and types on the intention of implementation is as shown in <Table 4>. The first hypothesis 'Economic responsibility will have an influence on the intention of implementation' among 5 hypothesis related to 5 levels showed a significant path coefficient ( $\beta=-.243, t=-2.608, p<.009$ ) so that this hypothesis was selected.

As a result of analyzing the fourth hypothesis 'philanthropic responsibility will have an influence on the intention of implementation', the significant path coefficient was  $\beta=.406, t=3.829, p<.001$  so that the relevant hypothesis was selected.

Among the hypotheses related to 4 types, only the hypothesis related to cultural business in the hometown was selected, and the significant path coefficient of the seventh hypothesis 'Cultural business in the hometown will have an influence on the intention of implementation' was significant ( $\beta=.367, t=3.148, p<.002$ ) so that this hypothesis was also selected.(Table 4)

Table 4: Hypothesis Test Result

Hypothesis	Path	SC	SE	t	Significance Probability	Whether Adopted
H1	Economic → Implementation	-.243	.102	-2.608	.009	O
H2	Legal → Implementation	.031	.221	.171	.864	X
H3	Ethical → Implementation	.021	.207	.110	.913	X
H4	Philanthropic → Implementation	.406	.158	3.829	.001	O
H5	Environmental → Implementation	-.058	.085	-.593	.553	X
H6	Fan Rights → Implementation	.086	.093	1.317	.188	X
H7	Regional Culture → Implementation	.367	.171	3.148	.002	O
H8	Cause-related Marketing → Implementation	-.171	.097	-1.729	.084	X
H9	Social Philanthropy → Implementation	-.021	.148	-.178	.859	X

#### IV. DISCUSSION AND CONCLUSION

The purpose of this study was to analyze the club officials' intention of implementation of CSR activities according to the CSR activity level and type of professional sport clubs. The discussion and conclusion based on the hypothesis test result are as follows.

First, the economic responsibility among the CSR levels of professional sport clubs had a negative effect on the club officials' intention of implementation of CSR activities. Such research result corresponds to the result of a precedent study indicating that the economic responsibility of CSR could lead to the negative behavior of consumers as well as internal members<sup>22</sup>. In other words, it means that if internal members recognize that the club carries out the CSR activities for the benefit of the club, it may lead to a negative behavior of the members, and therefore, the professional sport club requires a strategic approach to obtain the benefit and public interest from the internal members and external consumers at the same time.

Second, the philanthropic responsibility among the CSR levels of professional sport clubs had a positive effect on the intention of implementation. Such result corresponds to the contents of studies carried out by An<sup>23</sup> and Jae-Won Cho and Jin-Soo Han<sup>24</sup> and the terms including 'social responsibility' and 'philanthropic activities' are understood as activities for public interest by the members. This shows that the internal members may show more reciprocal attitude towards the affiliated club for the club's voluntary philanthropic activities or the role as a corporate citizen. On the other hand, there is also a case that the philanthropic responsibility did not lead to a favorable attitude of consumers. For example, if a subject who implements the philanthropic responsibility is an enterprise used by the upper class such as a hotel, the consumers may show a negative recognition or may be insensitive to the philanthropic responsibility<sup>25</sup>.

Third, only cultural business in the hometown among the CSR types of professional sport club had a positive effect on the club officials' intention of implementation of CSR activities. This result corresponds to the result of airline's CSR activity-related study indicating that the regional cultural business activities affect the consumers' intention of action<sup>24</sup>. This has a noticeable positive effect than other CSR activity types since professional sport clubs secure fans based on their hometown and shows a characteristic of regionalism. Also, the members show a favorable attitude towards the activities including volunteer work in the hometown, support for arts and culture and educational activities that are directly related to the benefit of local residents.<sup>26, 27</sup>

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## A Study of Mentoring Experience-based Online Mentoring Matching Plan- Focusing on the Idea-Commercialization Support Platform

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### Abstract---

**Background/Objectives:** In an idea-commercialization support platform, online mentoring is given for idea incubation. For successful mentoring, appropriate mentor-mentee matching is crucial.

**Methods/Statistical Analysis:** To increase mentor-mentee matching rates, this study matches the keywords extracted from a mentee's ideas with those derived from the ideas on which a mentor provides mentoring. After estimating mentor-mentee experiences with the frequency of mentoring succeeded or failed, a mentor with a high level of experience was matched with a mentee.

**Findings:** According to analysis on a matching period by improving the mentor-mentee matching process, the percentage of matching for the day increased by 7.9%. Then, it declined by 13.6% in 7 or more days.

**Improvements/Applications:** It is able to increase the success rate of mentoring by improving the mentor-mentee matching process and shorten the period until mentoring is actually provided. Ultimately, it can increase satisfaction with a mentor's and mentee's satisfaction with the idea-commercialization support platform and facilitate online mentoring.

**Keywords---** Online Mentoring, the Creative Economy Town, Mentor-mentee Matching, Matching Process, Idea Commercialization.

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## I. INTRODUCTION

The UNCTAD's Creative Economy Report 2010 emphasizes that creative companies which have industrialized imagination and creative ideas created at the crossing of art, humanities and technologies have rapidly grown despite global recession<sup>1</sup>. In addition, it insisted that it is time to develop 'startup culture' into the mainstream and nurture small- and mid-sized enterprises with powerful brand as Korean conglomerates that have long been a source of Korea's economic power reach their limit. World economy has shifted from industry economy to knowledge economy and most recently to creative economy. A key element to creative economy is creativity-based industry. Thanks to its high economic growth and employment potential, it has been mentioned as the subject of key policies in major states<sup>2</sup>. In the Republic of Korea, on the contrary, there was a venture boom temporarily as a part of the government policy to get over the Asian Financial Crisis in the late 1990s. Since the IT bubble burst in the early 2000s, business startup has contracted sharply for a long period of time. To get over this obstacle, Korean governments provided assistance to the establishment of a decent business startup ecosystem. For example, the Roh Moo-hyun Administration announced, "Realization of the 2nd Science & Technology Superpower through the Construction of Science & Technology-centered Society" while President Lee Myung-bak unveiled a vision of "Top-level Advanced State, Rich State, Warm Society and Powerful Nation." Now, the Korean government aims to spread 'Creative Economy' with the vision of "Open a New Era with Creative Science & Technology."<sup>3</sup>

At present, Korean government announced 'Creative Economy' as a top strategy needed to handle national issues targeted to boost national economy and has established and operated a vision and goal for the realization of the goal. Now, it is a time for Korean government' to make continued efforts (e.g., public-private partnership, promotion of local creative economy, expansion of citizens' participation, etc.) and develop a new policy to spread 'creative economy' across the nation. To respond to this government policy and create new jobs, related government agencies have actively promoted startup and commercialization-related assistance programs. In a belief that there is a necessary to build a creative ecosystem for the commercialization of citizens' ideas along with a desire to realize the 'creative economy,' Korean government has attempted to build the ground for the 'creative economy' to allow people to get access to startup and commercialization-related assistance programs which have been operated by government bureaus and related agencies more easily. As a result, the open platform-oriented Creative Economy Town targeted to assist the commercialization of creative ideas was newly established on September 30, 2013.

## II. ONLINE MENTORING PROCESS

### A. *Idea-Commercialization Support Platform*

In terms of a foreign idea-commercialization support platform, there is the private service platform called 'Quirky.' Quirky([www.quirky.com](http://www.quirky.com)) is a social media-based product development platform which allows good ideas to be reflected on product development. If an idea is proposed, members review and assess it for improvement. If the product development generates some profits, they are shared based on the percentage of contribution among the participating members as well as the idea proposer.<sup>4,5</sup>

In the Republic of Korea, some conglomerates such as LG tried this idea support platform. The Idea LG launched in July 2014 by LG Electronics is a business model in which consumers are freely propose an idea and participate in assessment or commercialization, and sales profits are shared according to the percentage of contribution. It was designed to give 4% of the product sales to the idea proposer and another 4% to those who participated in the 'idea assessment' and 'product development.' However, this program was ended with the 4th program in June 2015 due to a concern about the leak of idea and complaint about the absence of channels for idea proposers to get feedback from experts or opinions from participants.<sup>6</sup>

With this kind of an idea support platform itself, it is difficult to make profits. Therefore, it is unlikely that it would be operated in a private sector. In the Republic of Korea where the ecosystem for business startup is still poor, in particular, the government's continued promotion and support are essential. At present, the online idea-commercialization platform 'Creative Economy Town' is operated by the KISTI under the supervision of the Ministry of Science, ICT and Future Planning.<sup>7,8</sup> It has built an environment in which citizens are able to freely express and commercialize their creative thoughts and launch business. The Creative Economy Town is a service which provides online mentoring to propose diverse ideas and build their values and give commercialization support on the ideas on which mentoring is not provided anymore.<sup>9</sup>

For the promotion of the idea-commercialization support platform, online mentoring which develops hard-to-commercialize ideas is most important. A key to this kind of important online mentoring is to recommend a perfect mentor in a fast and efficient manner<sup>10</sup>.

**B. Online Mentoring Process**

A mentee submits his idea after deciding if it would be commercialized or valued as a simple idea itself. For an idea which is subject to simple assessment, mentoring is provided after its creativity and technical aspect are reviewed by the mentor. For an idea proposed for the purpose of commercialization, an online mentor examines if a similar idea already exists, and its technicality, profitability and marketability. Then, online mentoring which would be helpful in developing the idea is provided to a mentee for about a month. Then, the mentee may choose a mentor, or vice versa. Then, the idea which has matured after the online mentoring for a month may be able get aid for commercialization after through a review by the Incubating Idea Selection Committee.

For online mentoring, a mentee selects at least one field for mentoring among a total of 11 sectors (e.g., idea materialization & technology development, establishment of intellectual property rights, prototype development, preparation of BM and business plan, financial accounting, marketing, funds, overseas expansion, utilization of intellectual property rights, valuation & technology transfer, distribution, e-commerce, etc.) and proposes an idea.

Meanwhile, a mentor specifically describes a field on which mentoring can be provided and has it available for a mentee. In an idea-commercialization support platform, online mentoring is provided (see Figure 1) after mechanically matching (see Table 1) a mentee’s wanted field with a mentor’s field for mentoring to find the perfect mentor for a mentee. Figure 1 reveals a mechanical matching on mentor-mentee items while Figure 2 illustrates a mentor-mentee matching process. After the matching, a mentee checks a mentor’s mentoring history and activities while a mentor reviews a mentee’s idea and decides if he/she would take the online mentoring job. If either mentor or mentee denies mentoring, matching is processed again.

**Table 1: Examples of the Preparation of Mentoring-Enabled Fields**

(Mentee Selection) Mentoring-wanted fields	(Mentor Technology) Mentoring-enabled fields
Idea materialization & technology development, Establishment of intellectual property rights, Prototype development, Preparation of BM and business plan, Financial accounting, Marketing, Funds, Overseas expansion, Utilization of intellectual property rights, Valuation and technology transfer, Distribution and e-commerce, etc.	Able to offer mentoring as follows:  <b>Example 1)</b> <i>Right now, I am in charge of quality management. This year is the 5<sup>th</sup> year I have worked for SEADRILL(Quality Management, Drillship Project). I handle the exterior duties for the drillship, the company's flagship model.                      To build a ship, we need to go through a lot of process inspections.                      These inspections are performed in the presence of a supervisor from the ship owners, and the findings during the inspection are handed to hand over a ship in perfect quality.                      We provide mentoring support in the said fields.</i>  <b>Example 2)</b> <i>As a researcher from the R&amp;D Division of Creative Chemistry CO., LTD, I provide mentoring in the followings:</i> 1. Processes relating to polymer PVC-based extrusion molding 2. Able to answer and handle to the questions about generals or living ideas regarding a window sash 3. Materials and conditions on environment-friendly materials and energy efficiency rating 4. Approach and understanding of chemical engineering through chemical engineering-related licenses (chemical engineer, industrial engineer hazardous material) 5. Approach to problem-solving using Six Sigma (greenbelt) 6. Idea on the approach and understanding of air-conditioning and refrigerating (installation & operation of air-conditioning and refrigerating machine, coolant change & filling, management and maintenance of parts such as compressor, condenser, evaporator, pump, motor, valve, etc.) I am capable of providing mentoring in the said sectors. Specifically, I am able to give advices on window and would like to have a talk in comfort.



formulating the frequency of mentor-mentee online mentoring matching succeeded (Sn) and failed (Fn), the experiences of both mentor and mentee are estimated. In other words, as the number of successful mentoring increases, the mentor-mentee experience rises as well. If a mentee's experience is equal to or greater than a mentor's, they are matched by applying weight (Wn) on the frequency of matching succeeded or failed.

$$\text{Mentee}(\text{Sn}) * \text{Wn} + \text{Mentee}(\text{Fn}) * \text{Wn} = < \text{Mentor}(\text{Sn}) * \text{Wn} + \text{Mentor}(\text{Fn}) * \text{Wn}$$

For the fast and efficient online mentoring, mentoring keywords and experience are estimated by analyzing the mentee-proposed idea and mentor's information. Then, a mentor whose experience is greater than a mentee's among the values with high matching rates between mentee's idea keywords and mentor's mentoring keywords is matched with a mentee.

$$\text{Matching}(\text{Mentee}(\text{Kn}) = \text{Mentor}(\text{Kn})) * (\text{Mentee}(\text{Sn}) * \text{Wn} + \text{Mentee}(\text{Fn}) * \text{Wn} = < \text{Mentor}(\text{Sn}) * \text{Wn} + \text{Mentor}(\text{Fn}) * \text{Wn})$$

### A. Results

For the improvement of the mentor-mentee matching process, the related values such as profitability, marketability and technicality other than a mentee's request for online mentoring were specified. Then, mentee's idea keywords and mentor's mentoring keywords were extracted, and mentor-mentee mentoring experiences were estimated. After a mentee's request for online mentoring, matching time declined as stated in Table 3. Table 3 reveals the time taken until online mentoring after a mentee applied for online mentoring. Among a total of 754 subject ideas, 163 ones (21.6%) were successfully matched for the day. In addition, the ideas which passed seven days after they were matched by the upgraded process accounted for 8.5% (64 ideas). Compared to the figure before the process improvement, the percentage of ideas matched, which passed at least seven days after matching decreased by 13.6%.

Table 3: Idea Mentor-mentee Matching Period after Improvement

<i>No. of Day(s) Elapsed</i>	<i>No. of Matching Ideas</i>	<i>Percentage</i>
For the day	162	21.6%
1	173	22.9%
2	94	12.5%
3	71	9.4%
4	75	9.9%
5	63	8.4%
6	51	6.8%
7	64	8.5%
Total	754 ideas	100%

## IV. DISCUSSION

For the efficient mentoring of a mentee's ideas in an idea-commercialization support platform, there should be mentoring with an appropriate mentor. Without proper mentor-mentee matching, the time needed until mentoring gets longer. In conclusion, satisfaction with the idea-commercialization support platform decreases.

This study attempted to shorten the mentor-mentee matching time by improving the mentor-mentee matching process in online mentoring, one of the most important processes in the idea-commercialization support platform. In the past, a mentee's wanted field was just matched with a mentor's mentoring field through keywords. In this study, the percentage of matching for the day increased by 7.9% after improving the mentor-mentee matching process. In addition, the percentage of matching in seven days or later declined by 13.6%.

In the upgraded matching process proposed in this study, the keywords extracted from a mentee's idea and mentor's mentoring idea are matched. Then, the experiences are estimated with the frequency of mentor-mentee mentoring succeeded and failed to match a mentor whose experience is greater than a mentee's with a mentee. The shortened mentor-mentee matching time would make a contribution to the fast and accurate fulfillment of online mentoring.

According to the matching process upgraded in this study, in case of a mentor who provided mentoring for the first time, he/she is not matched because of zero experience. In general, a mentee wants to be matched

with a mentor with a lot of mentoring experience. However, if a mentor has expertise on a mentee's idea, he/she might be matched with a mentee even without mentoring experiences. In this case, therefore, it is needed to extract more keywords from a mentor's profile and mentoring-enabled fields and have weight in keyword matching.

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## The Effect of Visual Dynamics between Brand Logo and AD Images on Cause-Related Marketing

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### Abstract---

**Background/Objectives:** This study examines the effect of visual dynamics between brand logo and ad image on cause-related marketing.

**Methods/Statistical Analysis:** The experiment was conducted on 64 college students, recruited from a college community. A total of 32 male and 32 female students (Mean age 21.58 years, SD = 2.42) participated. The experimental design of the current study consisted of a 2 × 2 factorial design, using an ANOVA that examined the interaction effects of ad image dynamics and brand dynamics.

**Findings:** The results of this study showed that ad image dynamics and brand dynamics had significant interaction effects on visual attention toward brand logo and ad images. In particular, results indicate that visual attention toward brand logo and ad image decreased when both advertising and brand were expressed dynamically. Results also indicate that the level of risk perception was highest when only the ad image was dynamic, as dangerous situations were expressed in the ad image.

**Improvements/Applications:** We proposed that when an advertiser creates a cause-related campaign, it is important to clarify the target area to gain attention through the dynamics of visual stimuli, and when marketers need to improve the effect of visual attention toward brands with a cause-related campaign, it is highly likely that applying dynamics only to the brand logo is the most effective.

**Keywords---** Visual Dynamics, Brand Logo, Ad Images, Cause-Related Marketing.

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## I. INTRODUCTION

While business strategies in the past were at a basic level, where companies pursued only economic profits, recent management has been operating at a comprehensive level, which considers social environments and values surrounding companies. Against this backdrop, corporate social responsibility has been recognized as an important issue, since corporate activities are connected to social values in modern society<sup>1</sup>.

Hence, many corporations have recently implemented cause-related marketing (CRM) at the level of company management. Cause-related marketing, a concept of integrating social responsibility activities into marketing, helps build a partnership with customers<sup>2</sup>. The connection between corporate activities and social values is considered as a corporate social responsibility, in which business firms contribute to actualizing social welfare and equality<sup>1</sup>. Previous research reveals that cause-related advertising actually improves the positive impressions of a firm<sup>3</sup>.

According to research on the effect of cause-related campaigns on consumers' decision-making, consumers have more favorable attitude, and higher purchasing intention, toward companies that implement this strategy<sup>2</sup>. Cause-related campaigns have been also reported to have an impact on building brand asset, as they cause emotional and behavioral responses<sup>4</sup>. Moreover, according to research on cause-related campaigns based on existing social benefits, consumers are likely to form a more favorable attitude toward firms when they are closely involved in beneficial activities, such as aid and disease prevention<sup>4</sup>.

As cause-related campaigns play an important role in achieving corporate goals, most previous research on the subject has focused on companies inducing public activities, and resultant positive effects. This includes favorable attitudes and confidence toward companies that help build brand asset values and improve company image<sup>5</sup>. Unfortunately, corporations often concentrate only on the fact that they are conducting public activities simply in order to promote themselves when it comes to cause-related campaigns. Thus, it is necessary to investigate the actual advertising effect of cause-related campaigns for company branding.

According to the hierarchy model of effectiveness, the advertising effect of cause-related campaigns also comes from paying attention to advertising through visual stimuli that cause visual attention<sup>6</sup>. This is because any advertising effect cannot be expected if advertising stimuli are not accompanied with visual attention<sup>7</sup>.

Therefore, the present study aims to investigate the effect of visual attention to a visual stimulus through dynamics. When a visual stimulus is dynamic, it implies that stationary images are perceived as if they are moving; this assumes that the advertising or brand image described dynamically can maximize the visual attention effect. Dynamics can be explained through movement theory, among the various theories of visual attention. According to this theory, movement can be either an opportunity or a risk in situations; as such, individual's eyes go to a moving object instinctively<sup>8</sup>. Therefore, dynamics of visual stimuli are considered a factor that evokes visual bias, in a manner much stronger than any other cue in the background<sup>9</sup>. In the past, research that has focused on the effect of dynamics of visual stimuli on visual attention toward brands has found that dynamically presented brands received higher visual attention, as well as more favorable attitude than others<sup>10</sup>. Hence, the dynamics of visual stimuli can easily evoke consumers' awareness toward advertising and brand recognition. In addition, based on movement theory, the dynamic of a visual stimulus is helpful to us if we quickly recognize the risk of traffic accidents, represented in the visual expression of cause-related campaigns. However, if all visual stimuli are dynamic in one advertisement, it may be more complex<sup>11</sup>. Therefore, we examine interaction effects of visual dynamics between brand logo and advertising images. In particular, we identify the impact of each level of dynamics on visual attention and the level of risk perception.

## II. LITERATURE REVIEW

### A. *Visual Stimulus of Advertising*

Visual stimuli in advertising can be presented with photography, illustration, color, typography, logo type and other visual expression techniques<sup>12</sup>. Visual stimuli are critical components in advertising campaigns, including in nonverbal messages (e.g., visual images, and other images). This is because these visual factors can influence attention to specific focal points and aid in understanding of ad messages<sup>13,14</sup>. Therefore,

utilization of visual stimuli in advertising is known as the primary method consumers use to collect information on brands and products during the decision-making process <sup>15</sup>.

Visual stimuli in advertising can have these effects because visual stimuli can deliver messages that cannot be explained with attitude or words quickly and efficiently, emphasizing originality and distinction in the product <sup>16</sup>. In other words, visual stimuli can sometimes deliver ad messages more efficiently, because people tend to pay less attention to text messages in advertising. Previous research on visual factors in ads has focused on secondary effects of ad messages, indicating that visual components in ads are supplementary elements to deliver ad messages. From the 1980s however, the quantitative expansion of advertising began, based on various media, and consumers were put in the center of advertising chaos. Such a trend resulted in a chance for hands-on workers and advertising researchers to concentrate more on the efficiency of advertising, and how best to attract the attention of consumers effectively and improve advertising attention effects. Naturally, this led to an increase of interest in visual stimuli in advertising <sup>17</sup>.

How do visual stimuli make consumers pay attention to advertising? There have been two major conceptualizations, including uniqueness theory and movement theory, to help explain how visual stimuli attract consumers in advertising. The theory of uniqueness indicates that if visual attributes of a certain stimulus are strikingly different from other surrounding factors, a differentiation effect occurs, which makes it easier to gain attention and attract interest in the advertising <sup>18</sup>. That is, consumers pay more attention to outstanding visual stimuli in the surrounding environment; several empirical studies have found that distinctive colors or sizes are likely to activate consumers' needs to seek deeper information in response to advertising <sup>19,20</sup>. Meanwhile, movement theory suggests that people tend instinctively to look at moving objects. This is because the movement can be opportunity to notice a risk in the surrounding environment. In general, movement is a basic component that leads to visual attention <sup>8</sup>.

Additionally, instinctive visual bias toward movement is not limited only to objects in the physical environment, but can also be applied to various virtual things, including TV and the Internet <sup>21</sup>. Accordingly, research on advertising has mainly focused on uniqueness theory to study the visual attention effect of visual stimuli in advertising. For example, banner advertising on the Internet has proved that outstanding visual stimuli, such as color, can be effective in raising visual attention <sup>22</sup>. Moreover, when it comes to printed advertising, presenting visual stimuli, such as facial cues, according to exposed focus parts of an advertisement model, or using distinctive and outstanding stimuli, such as overlapping cues, are reported to increase visual attention to advertising <sup>15</sup>.

However, visual stimuli that raise attention according to uniqueness theory mainly aim to make consumers focus on advertising through distinctive stimulus types. Therefore, there are limitations to delivering advertising messages after gaining visual attention <sup>18</sup>. Accordingly, there has been research verifying the effect of visual stimuli in advertising that can play a role in cognitive processes, along with visual attention, based on movement theory <sup>23,9,10</sup>.

### ***B. Dynamics of Visual Stimuli in Advertising***

The dynamic of visual stimuli in advertising can be defined as "the level of recognized movement from a stationary image" <sup>10</sup>. Here, the type of dynamics has a different meaning from actual movement (i.e. stationary movement or frozen motion) <sup>24</sup>. Therefore, visual stimuli being dynamic means that stationary visual images look like they are moving.

Research on dynamics of visual stimuli has been conducted in various sectors, including advertising and consumer behaviors, as well as in art and cognitive psychology <sup>25</sup>. In art, for example, dynamics of visual stimuli were revealed to be an important factor to express a visual stimulus, along with color, shape, and structure <sup>24</sup>. As for cognitive psychology, it was revealed that when a dynamic image is overlapped with another image, or if many dynamic images are presented at the same time, the level of movement perception from the images decreases <sup>26,27</sup>. When it comes to advertising, according to a previous study, dynamic images improve consumers' cognitive ability toward advertising, and increase the authenticity of advertising <sup>28</sup>. Moreover, studies on advertising effects have reported that, based on dynamics of visual stimuli, dynamic images increase an individual's memory of advertising and, in turn, positively affect attitudes toward the brand <sup>10</sup>.

Meanwhile, detecting movement operates human's survival system of animacy (i.e. the level of feeling something is alive through movement) with visual responses through attention. In particular, as the system is prioritized to humans' visual process order, it arouses visual attention<sup>29</sup> and responds immediately to unexpected situations, to enhance the perception of dangerous situations<sup>30,31</sup>. Actually, research of evolutionary psychology has shown that such characteristics are expressed in the dynamics of visual stimuli in specific scenes<sup>32</sup>. These findings show that the dynamics of visual stimuli are effective cues for perceiving dangerous situations, according to the principle of the above mentioned movement theory.

Accordingly, some advertising studies on the effect of the dynamics of visual stimuli have reported that visual stimuli applied with dynamics in advertising can increase attention from consumers. For example, consumer research pertaining to the attention effect of dynamics on visual stimuli, specifically in traffic signs, was conducted using an eye tracker. This research found that the more dynamic the traffic signs, the higher the visual attention, and the quicker the perception of possibly dangerous situations<sup>9</sup>.

However, since existing studies have been conducted by separating an ad image and brand's effect, it is necessary to investigate in detail how each dynamic of visual stimuli affects another in a single advertisement, where such stimuli are complexly mixed. For example, if a large amount of visual stimuli are expressed dynamically, such visual stimuli might reduce the effect of the advertising. This can be explained through visual complexity of advertising. Visual complexity is determined by the number of components, heterogeneity, and splendor of design in advertising. In addition, this has been reported to appear when the amount of the information provided is large, or when many colors or animation are used<sup>11</sup>. As visually complex advertising requires a great deal of cognitive resources to process information compared to normal advertising<sup>33,34</sup>, the advertising effect is decreased. That is, if a single advertisement has numerous dynamic visual stimuli, it may become too visually complex, and ultimately distract receivers' attention. In support of this, it was revealed, using an eye tracker, that banner advertising on the Internet could attract more attention with a moderate level of splendor, rather than being too simple or containing too much visual stimuli, including animation and color<sup>22</sup>.

The current study established the following hypotheses to investigate the most effective way of attracting attention toward ad images that aim to promote companies through cause-related campaigns, or to maximize visual attention toward brand and organizing dynamic factors.

**Hypothesis 1-1.** Dynamics of brand (dynamic/static) and dynamics of ad image (dynamic/static) will have an interaction effect on visual attention toward brand logo.

**Hypothesis 1-2.** Dynamics of brand (dynamic/static) and dynamics of ad image (dynamic/static) will have an interaction effect on visual attention toward ad image.

**Hypothesis 2.** Dynamics of brand (dynamic/static) and dynamics of ad image (dynamic/static) will have an interaction effect on levels of perception of risk.

### III. STUDY METHODS

The experiment was conducted on 64 college students, recruited from a collage community. A total of 32 male and 32 female students (Mean age 21.58 years, SD = 2.42) participated. Experimental stimuli were selected through a pilot study ( $N = 20$ ). As for brand logo, in order to adjust dynamics, and to simulate existing research<sup>10</sup>, a brand logo whose movement can be manipulated (i.e. Ferrari: shape of horse) was selected among the top 100 car makers in the world<sup>35</sup>, and a dynamic logo and a static logo were manufactured. For ad image, existing research was referred to for manipulating traffic sign images<sup>9</sup> and a dynamic and static image were manufactured.

The participants were randomly assigned to four groups ( $n = 16$ ) according to ad image (dynamic/static) and brand (dynamic/static) dynamics, for an experiment session consisting of a "relaxation session" (30 sec), eye tracking training (2 min), advertising session (8 min), and post questionnaire (approximately 10 min). Therefore, the experimental design of the current study consisted of a  $2 \times 2$  factorial design, using an ANOVA that examined the interaction effects of ad image dynamics and brand dynamics.

The procedure was as follows: participants entered the laboratory, and closed their eyes for approximately 30 seconds, breathing comfortably, and relaxing. When participants were calm by completion of the relaxation procedure, eye tracking was set on a computer monitor to adjust the position of the

participants, so that their eyes could be right at the middle of the screen. Upon completion of equipment setting, eye tracking training (i.e. calibration) for adjusting eye movement was conducted for approximately 2 minutes. Later, the researcher delivered instructions and precautions, stating: "Now you will watch a total of 3 advertisements, each of them lasting for 35 seconds. You will answer a simple survey for each advertisement, and then watch the next advertisement." The lab was set to prevent the occurrence of visual stimuli, and resulting eye movement, outside of the visual field of the computer monitor. Following the experiment, participants were ushered into a separate room by experiment assistants to complete a post-questionnaire. <Table 1> shows the process of the experiment.

Table 1: Process of Experiment

Advertising	brand	eye-tracking	Presenting advertisement(by traffic accident type)						Post-survey
dynamic	dyna mic	-	drunk driving	instructio n	drowsy driving	instructio n	mobile phone use	instructio n	experie nce (driving, traffic accident)
	static								
static	dyna mic								
	static								
Time of each section		2 min	8min						10 min

Note: The level of risk perception is measured in the instruction session.

When evaluating advertising related to traffic accidents, past experiences of driving and traffic accidents can affect the dependent variable (visual attention, level of risk perception) that the experiment aimed to measure. Therefore, the study conducted an ANCOVA, where driving experience and traffic accident experience were control variables. Accordingly, those experiences were measured with a 6-point scale. In particular, each item consisted of driving experience (0 = *None* and 5 = *A Great Amount*) and traffic accident experience (0 = *None* and 5 = *Many*).

Visual attention was measured using an RED-250 eye tracker by SMI. The study measured X and Y coordinates and latent stage of pupil at 60Hz per second, and converted this information into digital video signals <sup>36</sup>. Stimulus presentation was controlled with Experiment Suite 360" software and eye movement responses were recorded. The current study was focused on visual attention toward an ad image and brand logo. Thus, stimulus areas (AOI: area of interest) were set by separating advertising sectors into visual factors (ad image, brand logo), and then visual response for each area was measured. As for attention time (ms), differences may occur according to the size of the areas of a presented ad image and brand logo. As such, a relative ratio of visual attention time, dwell time (%), which is a percentage of time dwelling on a specific area out of the total area of advertising, was used for the measurement of visual attention <sup>36</sup>.

The level of risk perception in the study was conceptualized as the level of risk of traffic accidents perceived by respondents from exposure to a cause-related advertisement. Items concerned with the level of risk perception, created by Brouwers and Sorrentino<sup>37</sup>, and then revised by Yoon and Mayer <sup>38</sup> to be suitable for cause-related advertisement on traffic accidents, were employed. The items included statements such as, "The advertisement made me think that drunk driving is a very dangerous problem" and "After watching the advertisement, I think drunk driving is a serious problem that can happen to me as well." In addition, items for types of traffic accidents (drunk driving, drowsy driving, and using mobile phone while driving) were presented. Each item was measured with 5-point scale from *Not at all* (1) to *Very much* (5). The confidence coefficient of each was significant at  $\alpha = .77$ .

#### IV. RESULTS

Therefore, Regarding visual attention toward brand logo, covariate analysis was conducted, with ad image dynamics and brand dynamics as variables among groups, and by controlling for participants' personal experiences of driving and traffic accidents, in order to investigate if the effects of ad image dynamics and brand dynamics are interactive. Table 2 and Table 3 show descriptive statistics and the results of covariate analysis according to ad image dynamics toward brand logo and visual attention for brand dynamics.

As shown in Table 3, ad image dynamics and brand dynamics had a significant interaction effect on visual attention toward brand logo ( $F(1,64) = 17.09, p < .001$ ), supporting hypothesis 1-1. Therefore, brand dynamics was effective when applied to static advertising rather than dynamic one, and dynamically

described brand logo and ad image rather decreased visual attention toward brand logo. Figure 1 indicates an interaction effect on dwell time (%) on brand logo.

Table 2: Technological Statistics of Visual Attention Toward Brand Logo

		brand dynamics		
		dynamic	static	Total
ad image dynamics	dynamic	6.26 (2.63)	6.54 (3.75)	6.40 (3.19)
	static	15.60 (8.95)	5.70 (4.08)	10.65 (8.49)
Total		10.93 (8.04)	6.12 (6.71)	8.52 (6.71)

Note: Standard deviation is in parentheses

Table 3: ANCOVA Results on Visual Attention Toward Brand Logo

Variable	SS	df	MS	F
covariate variable (driving experience)	75.14	1	75.14	2.76
covariate variable (experience of accident)	123.68	1	123.68	4.54*
ad image dynamics (A)	232.23	1	232.23	8.53**
brand dynamics (B)	292.63	1	292.63	10.75**
A*B	465.11	1	465.11	17.09***
Error	1578.55	58	27.22	
Total	7487.47	64		

\*p < .05, \*\*p < .01, \*\*\*p < .001

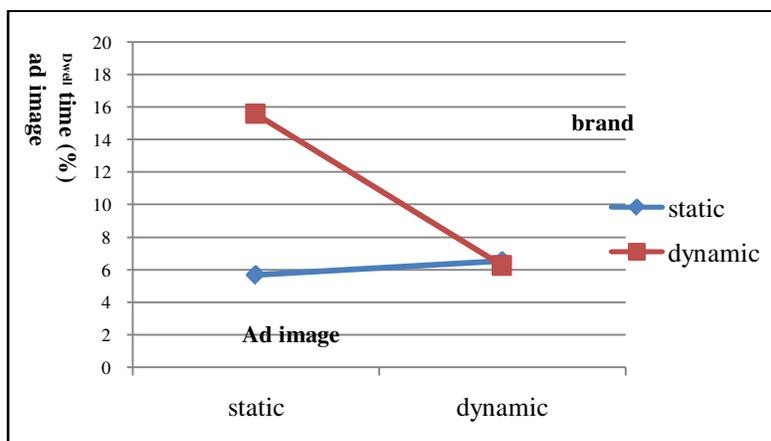


Figure 1: Interaction Effect on Dwell Time of Ad Image

Concerning visual attention toward ad image, covariate analysis was conducted, with ad image dynamics and brand dynamics as variables among groups, and by controlling for participants' personal experiences of driving and traffic accidents, in order to investigate if the effects of ad image dynamics and brand dynamics are interactive. Table 4 and Table 5 show descriptive statistics and the results of covariate analysis according to Adimage dynamics toward brand logo and visual attention for brand dynamics.

As shown in Table 5, ad image dynamics and brand dynamics had a significant interaction effect on visual attention toward ad image ( $F(1,64) = 8.31, p < .01$ ), supporting hypothesis 1-2. Therefore, ad image dynamics were effective when applied to static advertising, rather than dynamic one, and a dynamically described brand logo and ad image rather decreased visual attention toward ad images. Figure 2 indicates an interaction effect on dwell time (%) on ad images.

Table 4: Technological Statistics on Visual Attention Toward Ad Image

		brand dynamics		
		dynamic	static	Total
ad image dynamics	dynamic	22.51 (8.57)	34.15 (12.81)	28.33 (12.24)
	static	22.30 (7.35)	21.31 (6.36)	21.80 (6.78)
Total		22.41 (7.85)	27.73 (11.89)	25.07 (10.35)

Note: Standard deviation is in parentheses

Table 5: ANCOVA result on Visual Attention Toward Ad Image

Variable	SS	df	MS	F
covariate variable (driving experience)	5.61	1	5.61	.07
covariate variable (experience of accident)	145.29	1	145.29	1.74
ad image dynamics (A)	740.44	1	740.44	8.89**
brand dynamics (B)	533.99	1	533.99	6.41*
A*B	692.48	1	692.48	8.31**
Error	4831.08	58	83.29	
Total	46967.86	64		

\*p < .05, \*\*p < .01, \*\*\*p < .001

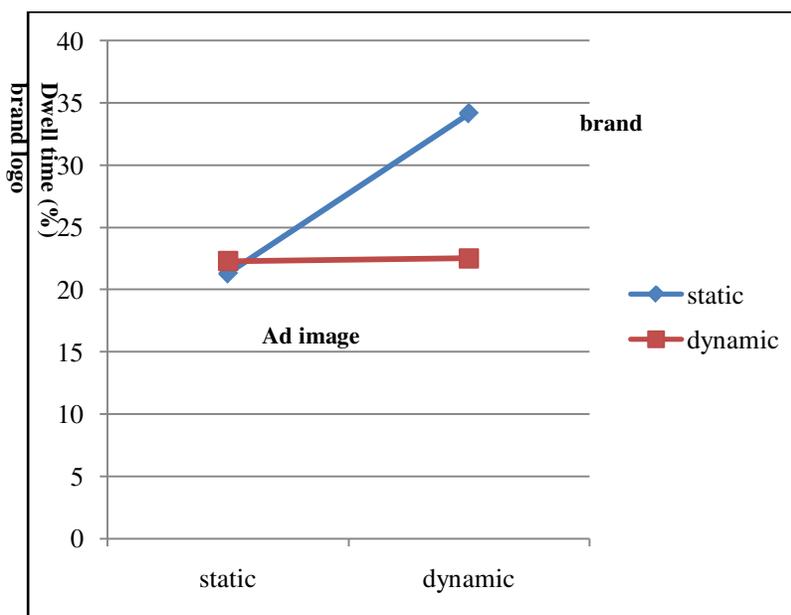


Figure 2: Interaction Effect on Dwell Time of Brand Logo

To determine risk perception toward advertising, covariate analysis was conducted, with ad image dynamics and brand dynamics as variables among groups, and by controlling for personal experiences of driving and traffic accidents, in order to investigate if the effects of ad image dynamics and brand dynamics are interactive.

Table 6 and Table 7 show descriptive statistics and the results of covariate analysis according to ad image dynamics toward the level of risk perception.

As indicated in Table 7, ad image dynamics and brand dynamics had a significant interaction effect ( $F(1,64) = 13.42, p < .001$ ), providing support for hypothesis 2.

Therefore, the level of risk perception toward advertising was the highest with an advertisement with a dynamic ad image and static brand logo, and a dynamically described brand logo and ad image relatively decreased the level of risk perception. Figure 3 indicates an interaction effect on the level of risk perception.

Table 6: Technological Statistics on the Level of Risk Perception

		Brand dynamics		
		Dynamic	Static	Total
ad image dynamics	dynamic	3.52 (.41)	3.92 (.54)	3.72 (.51)
	static	3.53 (.44)	3.08 (.46)	3.31 (.50)
Total		3.53 (.42)	3.50 (.65)	3.51 (.54)

Note: Standard deviation is in parentheses

Table 7: ANCOVA result on the Level of Risk Perception

variance source	SS	df	MS	F
covariate variable (driving experience)	.28	1	.28	1.30
covariate variable (experience of accident)	.04	1	.04	.19
ad image dynamics (A)	2.85	1	2.85	13.05***
brand dynamics (B)	.01	1	.01	.04
A*B	2.94	1	2.94	13.42***
Error	12.69	58	.22	
Total	808.42	64		

\*p < .05, \*\*p < .01, \*\*\*p < .001

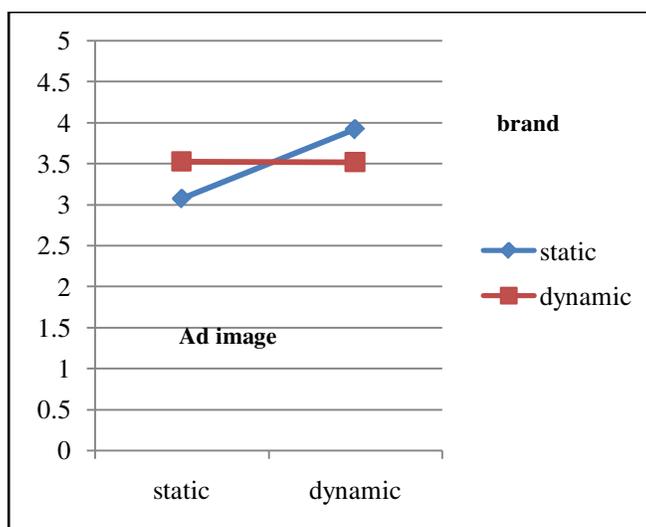


Figure 3: Interaction Effect on Level of Risk Perception

## V. CONCLUSION

The current study aimed to systematically investigate the effect of cause-related advertising through dynamics of visual stimuli. Accordingly, we examined the role of ad image dynamics (dynamic/static) and brand dynamics (dynamic/static) on visual attention toward brand logo and ad images, as well as on the level of perception of risk. Results revealed that hypotheses 1-1 and 1-2 were supported. That is, for visual attention toward brand logo or ad image, interaction effects between ad image and brand dynamics are fairly significant. In particular, the level of visual attention toward brand logo was highest when only brand logo was dynamic, while the level of visual attention toward ad image was highest when only ad image was dynamic. However, results indicate that visual attention toward brand logo and ad image decreased when both advertising and brand were expressed dynamically. Our results are consistent with the previous study, which found that visual complexity can occur when various visual stimuli are dynamically expressed in a single advertisement, as dynamics makes movement recognized like animation<sup>33</sup>.

Results also indicate that the level of risk perception was highest when only the ad image was dynamic, as dangerous situations were expressed in the ad image. Conversely, when both the ad image and brand logo were dynamically expressed, the level of risk perception relatively decreased. That is, dynamics of visual stimulus can increase the level of risk perception based on movement theory<sup>8</sup>. Moreover, the result that the level of risk perception relatively decreased when all visual stimuli were dynamic is in accordance with the findings of a study, which indicated that a visually complex advertisement decreases the advertising effect, as this type of image requires a great deal of cognitive resources to process the information<sup>34</sup>. Interestingly, when ad image directly described dangerous situations statically, and with a dynamically presented brand logo, the level of risk perception toward the advertisement was somewhat maintained. This shows that if visual stimuli are dynamically expressed in advertising, the level of risk perception toward the advertisement can be maintained or improved.

The current findings have several implications about the effective use of dynamic visual stimuli in cause-related advertising. We found that dynamics of visual stimuli had an inverted-U-shaped relationship, similar to arousal level, from a theoretical standpoint. Therefore, according to these results, a moderate level of dynamic visual stimuli in one advertisement is the most effective at attracting visual attention. Moreover, our results reveal that dynamics have something to do with the persuasion process of advertising, allowing dangerous situations to be recognized more easily. As such, when an advertiser creates a cause-related campaign, it is important to clarify the target area to gain attention through the dynamics of visual stimuli, and when marketers need to improve the effect of visual attention toward brands with a cause-related campaign, it is highly likely that applying dynamics only to the brand logo is the most effective.

Despite such implications, some limitations are noted. First, as for brand logo, the static logo was made for the study, but Ferrari's dynamic logo was used. Therefore, it is not certain if the attention toward the brand logo was due to the dynamics of the brand or a relative effect of familiarity toward the brand. Thus, future research can examine the dual effect of familiarity and the dynamic nature of the brand logo. Second, the actual advertisement space is very complicated and as such, is affected by numerous variables. Therefore, it is required to compare effects of a larger sample of stimuli in order for results to be applied to the actual field of advertisement. It is expected that comparing effects of more visual stimuli and message stimuli (e.g., narrative message, space construction, etc.) can derive interesting results.

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## The Effect of Patent Application on the Total Factor Productivity in Korea

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### Abstract---

**Background/Objectives:** Korea has changed the economic growth strategy from factor inputs oriented strategy to innovation driven strategy in 21st century. It is necessary for Korea to pursue a technical progress based on the accumulation of knowledge capital and human capital.

**Methods /Statistical Analysis:** Using the panel data for 28 industries in Korea during 1983-2010 periods, we estimated the OLS, the fixed effect model and the random effect model for the Total Factor Productivity equation. We selected an optimal model among three models using Hausman test estimates.

**Findings:** We found that R&D investments increase will increase patent application which will increase the knowledge stock and TFP finally. Firstly, it is very crucial for the Korean economy to increase R&D inputs to enhance TFP.

Secondly, we must set up national R&D investment strategy in order to keep up with steady R&D investment. We need a systematic approach for the government sector R&D investments to increase at a steady rate in the medium-term fiscal plan. Thirdly, we obtained differential effects of R&D investment on TFP for an industry.

**Improvements/Applications:** It is very crucial for the Korean economy to increase R&D inputs to enhance TFP. Thus, the government may use results of this study for the allocation of R&D expenditures in the R&D budget.

**Keywords---** Patent, R&D, Total Factor Productivity, Knowledge Capital, Korea.

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## I. INTRODUCTION

In the 21st century the paradigm of the world economy changes as shown in <Table 1>.

Table 1: Paradigm Changes of the World Economy in 21st Century

Classification	Old Paradigm	New Paradigm
Sources of economic efficiency	▪ Economies of scale	▪ Economies of variety ▪ Economies of scope
Stage of economic development	▪ Industrialization period	▪ Knowledge based period
Engine of economic growth	▪ Physical capital	▪ Knowledge capital ▪ Human capital

As the environments of the World economy have changed the Korean economy has to seek for the new strategy for economic growth in 21st century. Nowadays the strategy for the economic growth of Korea is now being changed from factor inputs oriented growth strategy into innovation driven growth strategy. It is necessary for Korea to pursue the innovation driven growth strategy that she should achieve a technical progress based on the accumulation of knowledge capital and human capital. Especially the accumulation of knowledge capital is determined by the national R&D investments. We need to analyze the long-run economic performances of R&D investments in various aspects in order to maximize their achievements. Also we had better analyze the effects of R&D investments by industry to determine the priority of R&D investments.

We analyze effects of the patent application increase on Total Factor Productivity (hereafter, TFP). The channel of patent application increase on TFP is as follows. An increase in patent application will increase the knowledge capital stock through knowledge stock accumulation equation. Then an increase in knowledge capital stock will enhance TFP. We estimate the elasticity of TFP with respect to the knowledge capital stock for the Korean economy as well as eight industry groups.

Our study aims to determine the effect on the industry knowledge capital stock TFP quantitatively, because it specifically to obtain the elasticity value in the knowledge capital stock of TFP knowledge capital and TFP between the log- linear form set of estimating equations and variables will be estimated with control variable vector.

Also, we estimate economic benefits of TFP increase using the Input-Output analysis. An increase in TFP will require less factor inputs to produce the same objective output so that an increase in TFP results in cost savings.

## II. AN ANALYSIS ON THE EFFECT OF KNOWLEDGE CAPITAL STOCK ON TFP: THEORETICAL BACKGROUND

An increase in patent applications increases the knowledge capital stock and an increase in knowledge capital stock will increase the TFP. We explain the channels as follows.

### A. Stage 1: The Channel of the Effect of Patent Applications on Knowledge Capital Stock

We estimate the knowledge capital stock for 28 industries using the perpetual inventory method. The knowledge capital stock follows the following process.

$$KN_{i,t} = (1 - \delta)KN_{i,t-1} + PAT_{i,t} \tag{1}$$

where  $KN_{i,t}$  and  $PAT_{i,t}$  represent the knowledge capital stock and the number of patent applications for industry  $i$  in year  $t$  respectively. We assume the depreciation rate of knowledge capital stock  $\delta$  to be 15% in <sup>1</sup>.

We estimate the base year knowledge capital stock ( $k_{i,0}$ ) following <sup>3</sup> as in equation (2).

$$k_{i,0} = \frac{PAT_{i,0}}{g+\delta} \tag{2}$$

where  $g$  represents the annual growth rate of patent applications and  $\delta$  denotes the yearly depreciation rate of the knowledge capital stock. Simply we assume that  $k_{i,0}$  equals to the  $PAT_{i,0}$  in 1983 (base year).

### B. Stage 2: The Channel of the Effect of Knowledge Capital Stock on TFP

An increase in knowledge capital stock increases the level of TFP. The problem is how we estimate the effect of the capital stock on the FTP.

Capital labor ratio( $\frac{K}{L}$ ) and trend line will be included in a candidate of the control variables. The equations are as follows.

$$\log(TFP) = \alpha + \beta \log KN + \gamma_1 TREND + \gamma_2 \log \left(\frac{K}{L}\right) + u \quad (3)$$

where  $KN$  is the knowledge capital stock,  $TREND$  is a time trend,  $\frac{K}{L}$  is the capital labor ratio,  $u$  is an error term. The error term is composed of the fixed effect terms( $\eta_i$ ) and the disturbance terms( $\epsilon_{i,t}$ ).

$$u_{i,t} = \eta_i + \epsilon_{i,t} \quad (4)$$

### III. TFP FUNCTION ESTIMATION RESULTS

#### A. Estimation Results for All Industries

Using the panel data for 28 industries in Korea during 1983-2010 periods, we estimated the OLS, the fixed effect model and the random effect model for the Total Factor Productivity equation (3). We selected an optimal model among three models using Hausman test estimates.

Figure 1 shows the time trends and the volatility of knowledge capital stocks ( $KN$ ) and  $TFP$  for the whole industry.

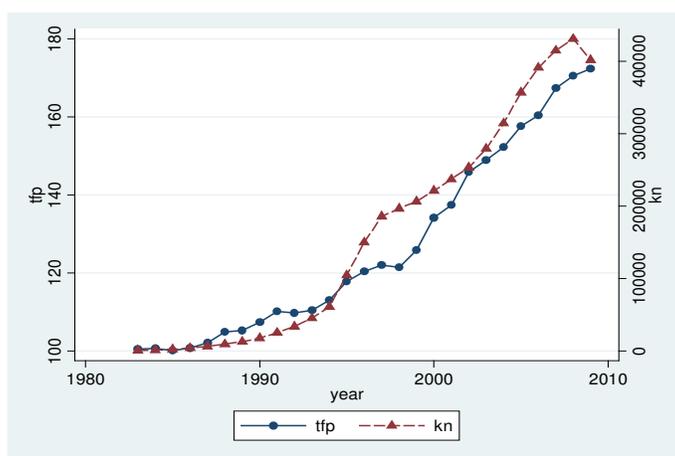


Figure 1: Trends of Knowledge Capital Stock and TFP for Whole Industry: 1983-2009

Note: The solid line represents TFP and the dotted line represents the knowledge capital stock

<Table 2> shows estimation result for the whole industry. Estimates in the first column mean pooled OLS results, those in the second column estimates come from the fixed effect model result, and, in the third column, estimates do from the random effect model. We selected the fixed effect model using Hausman test estimate which  $\chi^2$  statistics rejected null hypothesis. So we explain for the fixed effect model result.

Table 2:TFP function estimation results: All industries

Dependent variable: $\log(TFP)$			
	Pooled	FE	RE
$\log KN$	0.091*** (11.81)	0.018*** (4.96)	0.019*** (5.15)
Constant	4.180*** (89.74)	4.586*** (209.11)	4.581*** (54.68)
$R^2$	0.178	0.038	0.038
N	643	643	643

Note: t-values in parentheses. \*: significance level 10%, \*\*: significance level 5%, \*\*\*: significance level 1%.

The followings are main results of the first policy simulation. The elasticity of TFP with respect to the knowledge capital stock is 0.018, implying that 1% increase in knowledge capital stock will increase 0.018%

of TFP. Our estimates of the elasticity of TFP with respect to knowledge capital stock are a little bit lower than previous studies such as Lach4 who estimate the elasticity to be 0.30. <sup>2</sup> found that the elasticity of TFP of OECD countries was in the range of 0.06~0.2. <sup>3</sup>and <sup>4</sup> estimated the elasticity of TFP to be around 0.108. There are more studies on TFP and knowledge capital stock.

We also found that the higher the capital-labor ratio, the higher the elasticity of TFP with respect to knowledge capital stock.

We estimate the cost-saving effects of R&D investments in 2010 through TFP enhancement. The total cost reduction due to TFP increase is estimated to be 8,132 billion Korean Won in 2010 in Korea.

We also estimate the cost reductions due to TFP increase for 28 industries. The transportation and storage industry and the communication shows the highest cost reduction to be 1,221 billion Korean Won. The real estate and business activities industry ranks the second for 1,071 billion Korean Won cost reduction.

**B. Estimation Results by Industries**

We estimated the elasticity of TFP with respect to the knowledge capital stock for industry groups considering the panel data characteristics. We classify 28 industries into eight industry groups as shown in in <Table 3>.

Table 3: Bank of Korea 28 Industry Classifications Resort to 8 Industry Groups

Industry Group	Bank of Korea 28 Industry classifications
Group I	1.Agriculture, forestry and fishing, 2.Mining and quarrying, 3.Food, beverages and tobacco products
Group II	4.Textile and apparel, 5.Wood and paper products, 6.Printing and reproduction of recorded media
Group III	7.Petroleum and coal products, 8.Chemicals, drugs and medicines, 9.Non-metallic mineral products
Group IV	10.Basic metal products, 11.Fabricated metal products except machinery and furniture, 12.General machinery and equipment, 15.Transportation equipment
Group V	13.Electronic and electrical equipment, 14.Precision instruments, 16.Furniture and other manufactured products
Group VI	17.Electricity, gas, steam and water supply, 18.Construction
Group VII	21.Transportation, 22.Communications and broadcasting
Group VIII	24.Real estate and business services, 25.Public administration and defense, 26.Education, health and social work, 27.Other services, 28.Dummy sectors

In <Table 4> we show the TFP function estimation results for eight industry groups. The industry group VII standing for the transportation and the storage industry and the communication and the broadcasting industry show the highest elasticity of TFP with respect to the knowledge capital stock, 0.177. We may explain the reason why industry group VII shows the highest elasticity of TFP is such that R&D sector belong to this industry. Industry group VIII shows the second highest elasticity of TFP (0.168) and the third highest elasticity is 0.109 for industry group VI.

Table 4: TFP Function Estimation Results by Industries

Dependent Variable: $\log PAT$	Group I	Group II	Group III	Group IV	Group V	Group VI <sup>(a)</sup>	Group VII	Group VIII
Optimal Model	Random Effect	Fixed Effect	Fixed Effect	Random Effect	Random Effect	Pooled OLS	Fixed Effect	Pooled OLS
$\log KN$	0.071*** (8.93)	0.030*** (3.68)	0.035*** (10.80)	0.020*** (7.02)	0.049*** (6.70)	0.109*** (7.55)	0.177*** (7.54)	0.168*** (14.49)
$\log \frac{K}{L}$	0.087*** (9.14)	-0.041*** (3.61)						-0.625*** (18.20)
Trend	0.019*** (10.53)	-0.004** (3.28)						-6.07*** (3.93)
Constant	42.902*** (11.76)	13.368*** (5.01)	4.604*** (256.27)	4.646*** (52.42)	4.643*** (42.08)	4.305*** (42.70)	4.292*** (26.41)	0.006*** (3.96)
R <sup>2</sup>	0.094	0.418	0.602	0.322	0.355	0.695	0.527	0.824
N	78	81	81	108	80	27	54	107

Note: t-values in parentheses. \*: significance level 10%, \*\*: significance level 5%, \*\*\*: significance level 1%.

(a) Group VI consists of two industries, 17 and 18. The result shows industry 17.

#### **IV. CONCLUSION**

We found that R&D investments increase will increase patent application which will increase the knowledge stock, and TFP finally.

There are many crucial policy implications from our empirical findings. Firstly, it is especially important for the Korean economy to enhance TFP to sustain a potential growth rate, since inputs driven economic growth strategy have become ineffective due to diminishing marginal products of factor inputs such as capital and labor. Thus, it is very crucial for the Korean economy to increase R&D inputs to enhance TFP.

Secondly, we must set up national R&D investment strategy in order to keep up with steady R&D investment. We need a systematic approach for the government sector R&D investments to increase at a steady rate in the medium-term fiscal plan. In the case of private sector R&D investment, we need an incentive compatible scheme in tax and subsidy system for the private sector agents to perform R&D investments actively.

Thirdly, we obtained differential effects of R&D investment on TFP for an industry. Thus, the government may use results of this study for the allocation of R&D expenditures in the R&D budget.

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## Effects of Consulting Support Policy on Performance: Focusing on KCGF's Consulting Service

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### Abstract---

**Objectives:** Founded in 1976, the KCGF has provided local SMEs with credit guarantee service for the benefit of their seamless financing and engaged in management consulting service for SMEs, which is one of its core competencies, to help improve the competitiveness of its clients.

**Methods/Statistical Analysis:** The present study surveyed 123 companies in manufacturing, wholesaling and construction industries that received the management consulting service from the KCGF over the past five years, considered the rationale for the effects of management consulting support on management consulting performance, and reviewed the literature for the empirical analysis of the moderating effects of the companies' awareness and utilization of government policy funds on the relationship between the KCGF's management consulting support and the management consulting performance.

**Findings:** The analysis highlighted the KCGF's management consulting support had positive effects on the consulting performance and the companies' awareness and utilization of government policy funds failed to exert the moderating effects on the KCGF's consulting performance.

**Improvements/applications:** These findings suggest that institutional remedies should be reinforced by actively developing support policies for business clients in tandem with the government policy-based funding in order to improve the effects of the KCGF's consulting for SMEs.

**Keywords---** Korea Credit Guarantee Fund (KCGF), Consulting Support Policy, Consulting Performance, Government Policy Funds.

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## I. INTRODUCTION

The Korea Credit Guarantee Fund (KCGF) was established in June 1976 with a view to guaranteeing the credits of SMEs with inferior security capacities and thus to providing them with seamless funding opportunities. In tandem with the funding for SMEs, the KCGF has mainly engaged in the management consulting for SMEs to help enhance their competitiveness. The KCGF's management consulting service involves the consulting on management skills and relevant information intended to address the management and technology issues that SME clients are faced with and to cultivate their management capacities. The KCGF pursues the soundness of its operation by strengthening its clients' corporate competitiveness and management competencies with higher productivity, lower cost and better quality.

Initially, the KCGF's management consulting service was delivered via conferences, short courses and on-site consulting. Later on, with the advancement of the internet and the changing environment surrounding SMEs' management, its consulting service has evolved to cyber management support and provision of management information and data in addition to the conventional management consulting. Currently, the KCGF offers management support services including consulting, corporate training programs, and management-related reference data. The KCGF embarked upon the management consulting service in the midst of the country's foreign exchange crisis in 1997 when the management consulting was first instituted. Against a backdrop of unprecedented economic crisis, high-profile overseas consulting firms took the initiative in shaping a consulting boom in the local market and mapped out new management techniques and other approaches designed to overcome crises mainly for large enterprises. However, most SMEs were far from the voluntary clients in the management consulting market because they were hampered by poor management environment and financial pressure. After all, SMEs began to join the market when the government implemented the diverse support policy measures for vitalizing the consulting market for SMEs. The government announced in July 2004 the "SMEs' competitiveness enhancement plan" focusing on increasing SMEs' innovation capacity and global competitiveness instead of the traditional schemes focusing on protection and development, which contributed to the vitalization of consulting market for SMEs<sup>1</sup>. The KCGF's management consulting is intended to help the companies drawing on its credit guarantee service to enhance their competitiveness, address their management challenges, strengthen their innovative management capabilities and thus secure their global competitive advantage. To that end, the KCGF has employed a newly integrated practical PM(Project Manager) solution designed to implement the systematic provision of management consulting service, to handle overall consulting process ranging from the choice of consultants to post-hoc assessment of service offered and to clarify consulting tasks since February, 2005.

As part of the KCGF's management consulting service, the "KCGF SME Management Support Team" comprised of multi-disciplinary seasoned experts visits clients to identify their issues and problems and to formulate solutions including financial analysis across the board. Lately, to differentiate its service, the KCGF has developed its own unique and specialized management consulting projects involving not only the existing consulting service for startups, restructuring and general management but also the CRC (Credit Risk Control) for corporate credit ratings<sup>2</sup>.

Moreover, the KCGF relies on its management support team to play a role as a one-stop support entity covering consulting and training expenses in addition to financing. As part of its consulting service policy, the consulting expense up to 3 million Won is offered to the business clients using its credit guarantee scheme and meeting the preset conditions including startups less than 5 years old and companies completing its startup school program, whilst the preferred companies more than 5 years old and others are provided with 80% and 60% of the expense, respectively, so that startups and young companies with a short history can stabilize their business management and operation as soon as possible. For other support policies, the KCGF addresses the challenges resulting from the short-term one-off consulting service by developing its own specialized consulting domains, taking a follow-up process, analyzing the status of companies and offering company-specific management techniques or solutions, whilst on a long-term basis the KCGF offers a stepwise differentiated consulting service in accordance with the developmental stages of companies and improves its consulting performance including funding in connection with the credit guarantee business.

## II. RATIONALE AND LITERATURE

In reference to government-led consulting support projects for SMEs, Noh<sup>3</sup> reported the quality of government policy served as an important factor influencing the consulting performance. The factors

influencing the consulting performance proposed in literature include PR about government-led consulting support<sup>4</sup>; educational programs, consulting support and funding<sup>5</sup>; funding, educational programs and consulting support<sup>6</sup>; and policy funding, educational programs and consulting support<sup>7</sup>. Bae<sup>8</sup> explored the factors influencing the quality of consulting performance and reported the corporate factors, consultant factors and government policy factors served as independent variables influencing the consulting performance. Yoon<sup>9</sup>, Kim<sup>10</sup>, and Choi<sup>11</sup> analyzed the government policy factors as independent variables relative to the consulting performance. Gwak<sup>12</sup> suggested SME clients' understanding of and trust in consulting, consultants' expertise, systematic methodology, PR about government's awareness of consulting and support system as the principal factors affecting the management consulting performance. Jeong<sup>11</sup> sub-classified the KCGF's consulting support policy into the funding policy covering consulting expenses and the procedural improvement policy, and demonstrated the statistically significant effects of the support policy on the satisfaction with and utilization of consulting service.

### III. STUDY MODEL AND THEORETICAL DESIGN

The present study analyzed the effects of the KCGF's management consulting support on management consulting performance in order to increase the efficiency of the KCGF's management consulting support service. Also, the moderating effects of SMEs' awareness and utilization of government policy funds on the KCGF's management consulting performance were analyzed ultimately to enhance the PR activities relative to government policy funds and improve the management consulting performance.

Based on previous findings, the study model was developed for empirical analysis as shown in figure 1. To identify the relationship between variables constituting the study model, this study set up the hypotheses. To measure the theoretical constructs of the hypotheses with the questionnaire, the component variables were operationalized.

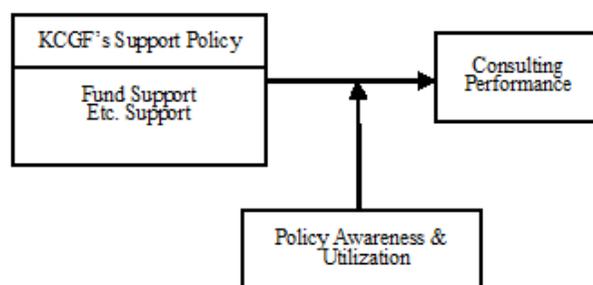


Figure 1: The Study Model

The present study conducted the empirical analysis to test the hypotheses, which were set up based on the underlying study model.

#### A. Questionnaire Design and Content

The dependent variable, i.e. consulting performance, was measured with the instrument adapted from those used by Choi<sup>11</sup> and Shin<sup>14</sup>. The instrument consisted of 6 question items [efficiency of consulting project budget and schedule (4,5), clients' overall satisfaction (1), problem solving (3) and increase in corporate value(6)]. To measure the independent variables, the KCGF's consulting support policies were sub-classified into funding(1, 2 and 3) and procedural support(4-8) by referring to the questionnaire used by Jeong<sup>13</sup>. The awareness and utilization of government policy funds was measured with an instrument adapted from the questionnaire used by Lim<sup>15</sup>. The question items about the awareness and utilization of government policy funds concerned the awareness of government policy funds and grants(1,2), the awareness of government's guarantee and allowance programs(3,4), and the utilization of such funds and programs(5). Each item was rated on a 5-point Likert scale (1= Never, 2=Negative, 3=Average, 4=Positive, 5=Very positive).

#### B. Data Collection

To survey the SMEs, which received management consulting services from the KCGF over the past five years, in respect to the KCGF's consulting support service and consulting performance, and to determine the moderating effects of the awareness and utilization of government policy funds, questionnaire responses

from 123 SMEs across the country were analyzed. As for the demographic information of the participant SMEs, 42.0%, 31.3% and 20.6% of the respondents were engaged in manufacturing, retailing and wholesaling and service, respectively. 38.9%, 35.9% and 22.1% of respondents hired 10 ~ 100, no more than five, and 5~10 employees, respectively. Email and on-site surveys were used. SPSS version 21 was used for statistical analysis.

**C. Hypotheses**

Hypothesis 1 : The KCGF's funding policy for management consulting and consulting performance

Assuming the KCGF's management consulting service exerts statistically significant effects on consulting performance based on previous studies, the present study hypothesized that the funding policy among the KCGF's management consulting support policies would influence the consulting performance.

H1-1 The KCGF's funding policy among its management consulting support policies will exert positive effects on the consulting performance.

H1-2 The KCGF's other support policy among its management consulting support policies will exert positive effects on the consulting performance.

Hypothesis 2 : Effects of the awareness and utilization of government policy funds and the KCGF's management consulting support policy on consulting performance

Lim<sup>11</sup> investigated the effects of consultants' competencies and government policy funding on management performance and reported the government policy funds had positive influence on SMEs' management performance. Kim<sup>10</sup> assessed the effectiveness of policy funding projects for SMEs and reported the policy funds supported SMEs' management performance. The present study hypothesized the following with a view to verifying the effects of the KCGF's management consulting support service on management consulting performance depending on SMEs' awareness and utilization of government policy funds.

H2-1 The awareness and utilization of government policy funds will moderate the effects of the KCGF's funding policy for management consulting on the consulting performance.

H2-2 The awareness and utilization of government policy funds will moderate the effects of the KCGF's other management consulting supports on the consulting performance.

**IV. EMPIRICAL ANALYSIS**

**A. Validity and Reliability Analyses**

**Validity Analysis**

As shown in table 1, the KCGF's management consulting support service and the consulting performance were selected as the independent variable and the dependent variable, respectively. First, each variable was analyzed in terms of validity and reliability.

Then, the correlation analysis and the multiple regression analysis were conducted of the variables whose validity and reliability were substantiated.

Table 1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin(KMO) measure of sampling adequacy	.785
Bartlett's test of sphericity and Chi-square approximation	390.258
df	28
Significance Probability	.000

Referring to the extent to which certain inter-variable correlations are explained by other variables relative to the independent variable, i.e. the KCGF's management consulting support, the Kaiser-Meyer-Olkin(KMO) value is 0.785, which is above the generally acceptable level of 0.7.

Used to confirm if the matrix of correlation coefficients is a unit matrix, the Bartlett's test of sphericity shows the significance probability is .000.

Hence, the KMO and Bartlett's test of sphericity substantiate the validity as shown in table 2.

Table 2: Validity Analysis

Variables	Component		
	Funding	Other	Commonality
Consulting support 1	.901	-.020	.813
Consulting support 2	.759	.307	.670
Consulting support 3	.709	.399	.662
Consulting support 4	.298	.680	.552
Consulting support 5	.201	.621	.425
Consulting support 6	.421	.603	.541
Consulting support 7	.139	.829	.707
Consulting support 8	.043	.842	.710
Eigen value	2.219	2.863	
Percent variance	27.738	35.784	
Cumulative percentage	63.523	35.784	

The measured variables in this study underwent a scale purification process to eliminate some items. First, the exploratory factor analysis was used to confirm the validity. The principal component analysis was used to extract constructs from all measured variables. To simplify the factor loadings, the orthogonal rotation(varimax) was adopted. Also, the eigen value is the sum of the squared loadings of all variables for a given factor, or the standardized variance relative to a given factor.

The criteria for selecting the question items were eigen values greater than 1.0, and factor loadings greater than 0.4. Meanwhile, the cumulative percentage(%), which is the rotation sums of squared loadings representing the total variance explained by two factors, is 63.5%, exceeding the generally acceptable level of 60%. Therefore, two factors fully explain the total variance. The rotated component matrix analysis using the orthogonal rotation (varimax) shows that the factor loadings of the funding for consulting service(.901, .759, .709) and other supports (.680, .621, .603, 829, 842) are above the generally acceptable level of 0.5 and that the commonalities are above the generally acceptable level of 0.4, which substantiates the validity.

**Reliability Analysis**

Table 3 shows the reliability analysis of the independent variable, i.e. the KCGF's management consulting support. As for the reliability of the question items on each variable, the Cronbach's Alpha coefficients are .773 and .799, which are above the acceptable level of 0.7, indicating the reliability is substantiated. The Cronbach's Alpha coefficients, in case of the question items being deleted, are below the Cronbach's Alpha coefficient per variable, indicating there is no need to eliminate the question items.

Table 3:Reliability Analysis (independent variable)

Independent Variable	Question Item	Cronbach's α with items deleted	Cronbach's α per variable
Consulting support	Funding 1	.650	.773
	Funding 2	.701	
	Funding 3	.727	
Consulting support	Other 1	.777	.799
	Other 2	.785	
	Other 3	.772	
	Other 4	.726	
	Other 5	.744	
Awareness and utilization of government policy funds	awareness 1	.884	.907
	awareness 2	.880	
	awareness 3	.927	
	awareness 4	.867	
	awareness 5	.869	

Meanwhile, Table 4 shows the reliability analysis of the dependent variable, i.e. consulting performance. The Cronbach's Alpha coefficient per variable is .922, which is above the acceptable level of 0.7, indicating the

reliability is substantiated. In that the Cronbach's Alpha coefficients when the items are deleted are below the Cronbach's Alpha coefficient per variable, the question items need not be eliminated.

Table 4: Reliability Analysis (dependent variable)

Dependent Variable	Question Item	Cronbach's $\alpha$ with items deleted	Cronbach's $\alpha$ per variable
Consulting performance		.905	.922
		.919	
		.910	
		.915	
		.900	
		.898	

**Correlation Analysis**

Table 5 shows the analysis of correlations between the independent variable (the KCGF's management consulting support), the awareness and utilization of policy funds, and the dependent variable (consulting performance). All correlation coefficients are statistically significant at the significance level of 0.01. Specifically, the two-tailed test indicates the funding and consulting performance are statistically significant with the significance probability being  $p=0.000$ . The Pearson correlation coefficient is .726, indicating a positive correlation, or positive effects by 72.6%. Other supports (.513) and awareness (.386), respectively, are positively correlated with the consulting performance, exerting positive effects.

Table 5: Inter-variable Correlation Analysis

Unit	Mean	SD	Inter-Construct Correlations			
			1	2	3	4
Funding	4.013	.796	1			
Other supports	4.378	.582	.537**	1		
Consulting performance	3.925	.761	.726**	.513**	1	
Awareness & Utilization	3.095	.979	.332**	.089**	.386**	1

\*\* . The significance level of correlation coefficients is 0.01 (two-tailed test).

**B. Hypothesis testing**

To test the fitness of the regression model for the independent and dependent variables, the independent variables' multi collinearity was diagnosed. On the grounds that all VIF values are below 10 and that the Durbin-Watsons value is 2.089, which is close to 2 rather than 0 or 4, the residuals are not correlated. Therefore, the regression model fits the variables as shown in table 6.

The correlation between independent and dependent variables is 0.741, which is a bit high.  $R^2 = .549$ , meaning the independent variable (the KCGF's management consulting support) explains the dependent variable (the consulting performance) by 54.9% as shown in table 7.

Table 6: Model Summary

Model	R	R <sup>2</sup>	Modified R <sup>2</sup>	Standard Error of estimate	Dubin-Watson
1	.741 <sup>a</sup>	.549	.541	.51551	2.089

a) Estimate  $\hat{y}$ : (Constant) Funding and Other supports

b) Dependent variable: Consulting performance

Table 7: ANOVA

	Sum of squares	df	Mean squares	F	Significance Probability
Regression Model	38.788	2	19.394	72.980	.000 <sup>b</sup>
Residual	31.990	120	.266		
Sum	70.678	122			

A) Dependent variable: Consulting performance

b) Estimate: (Constant), Other supports and Funding

The F value of 72.980 and the significance probability of .000(p<.05) indicate that at least one of the independent variables exerts significant effects on the dependent variable as shown in table 8.

Table 8: Coefficients

	Unstandardized coefficient	Standardized coefficient	t	Significance Probability	Collinearity statistics	
	B	β			Tolerance	VIF
(Constant)	.508		1.418	.159		
Funding	.606	.634	8.723	.000	.712	1.405
Other supports	.225	.172	2.370	.019	.712	1.405

As for the final results of the Hypotheses 1-1 and 1-2, the analysis indicates the KCGF's management consulting support exerts positive effects on the management consulting performance. With the t value of 8.723 and p value of .000 for the funding, the Hypothesis 1-1 is accepted. As for other supports, with the t value of 2.370 and p value of .019, the Hypothesis 1-2 is also accepted.

The t values indicate that the KCGF's funding for management consulting has the greatest effects on the management consulting performance and that other supports influence the management consulting performance as shown in table 9.

Table 9: Model Summary

Model	R	R <sup>2</sup>	Statistical Variation				
			R <sup>2</sup> Variation	F Variation	DOF 1	DOF 2	Probability F variation
1	.726 <sup>a</sup>	.528	.528	135.183	1	121	.000
2	.742 <sup>b</sup>	.551	.024	6.289	1	120	.013
3	.750 <sup>c</sup>	.562	.000	2.945	1	119	.089

a: (Constant) Funding

b: (Constant) Funding, Awareness & Utilization

c: (Constant) Funding, Awareness & Utilization, (Awareness moderates funding)

As for the Hypothesis 2-1 that the awareness and utilization of government policy funds will moderate the effects of the KCGF's consulting funding policy on consulting performance, the R<sup>2</sup> values gradually increase, i.e. 52.8%, 55.1% and 56.2% in the models 1, 2 and 3, respectively. Here, the significance probability F variation in the third step is 0.089, which is above 0.05, indicating no significant increase at the significance level as shown in table 10. Thus, the awareness and utilization of government policy funds failed to exert the moderating effects on the KCGF's funding policy for management consulting and consulting performance.

Table 10: Model Summary

Model	R	R <sup>2</sup>	Statistical Variation				
			R <sup>2</sup> Variation	F Variation	DOF 1	DOF 2	Probability F Variation
1	.513 <sup>a</sup>	.263	.263	43.111	1	121	.000
2	.616 <sup>b</sup>	.380	.117	22.630	1	120	.000
3	.618 <sup>c</sup>	.383	.003	.544	1	119	.462

a: (Constant) Other supports

b: (Constant) Other supports, awareness & Utilization

c: (Constant) Other supports, awareness & Utilization, (Awareness moderates Other supports )

As for the Hypothesis 2-2 that the awareness and utilization of government policy funds will moderate the effects of the KCGF's other supports for consulting on consulting performance, the R<sup>2</sup> values gradually increase, i.e. 23.3%, 38.0% and 38.3% in the models 1, 2 and 3, respectively. Here, the significance probability

F variation in the third step is 0.462, which is above 0.05, indicating no significant increase at the significance level. Thus, the awareness and utilization of government policy funds failed to exert the moderating effects on the KCGF's other supports for management consulting and consulting performance.

## **V. CONCLUSION**

### **A. Summary of Findings**

The present study surveyed local SMEs that received the KCGF's support over the past five years concerning the KCGF's management consulting support policy as the factor influencing the consulting performance, and empirically analyzed if the awareness and utilization of government policy funds would moderate the effects of the KCGF's management consulting support policy on the consulting performance. The KCGF's management consulting support policies were sub-classified into the funding policy and other support policy for the analysis. The awareness and utilization of government policy funds were defined as the extent to which a range of government policy funds and public guarantee schemes for SMEs were perceived and used for the analysis. The analysis highlighted the following. First, the KCGF's funding policy as part of its management consulting support policies exerted statistically significant positive effects on the consulting performance. Second, the KCGF's other support policy exerted statistically significant positive effects on the consulting performance. By contrast, SMEs' awareness and utilization of government's policy funds and public guarantee schemes failed to have statistically significant effects on the KCGF's management consulting support policy and consulting performance.

### **B. Theoretical and Practical Implications**

The foregoing findings have the following theoretical implications. It is necessary to substantially increase and reinforce the funding and other support measures including the management consulting projects for SMEs provided by the KCGF. Management consulting adopted mostly by large enterprises since the late 1990s has provided new insight and guidance for companies to cope with the growing global competition. However, it is not easy for SMEs or SMBs to get any quality management consulting service on their own. The poor management environment and financial difficulties local SMEs are faced with have hindered them from their voluntary access to consulting service. It is the central government that took the initiative in supporting SMEs with consulting service and enhancing their competitiveness. To boost the global competitiveness of SMEs and seek alternative breakthroughs, the government has provided a range of consulting support schemes for a radical overhaul of SMEs' management and operation. The KCGF's consulting support projects are part of the government-led funding and procedural support schemes for SMEs intended to facilitate their access to consulting service. The present findings suggest the consulting projects for SMEs require extensive support measures from the government or public agencies as there still remain some barriers that keep SMEs from independently gaining the competitiveness or competitive advantage via consulting and new management approaches. Therefore, the government or relevant agencies need to directly and indirectly support SMEs with consulting. Also, it is necessary to discover some specific domains and fields that need to be supported and reinforced in practice. That is, not only the expenses incurred in relation to consulting service but also the entire procedure and operation of consulting service should be supported. Lastly, the finding that the awareness and utilization of government policy funds failed to influence the consulting performance sheds light on the lack of extensive understanding and utilization of government's SMEs-related policies as well as the need for efficient PR about the government's policy for SMEs.

### **C. Limitations and Suggestions for Further Studies**

Despite the foregoing theoretical and practical implications, the present study has the following limitations. First, the respondents and sampling were limited. The survey respondents failed to fully represent the entire pool of the KCGF's clients. Also, the sampling process revealed some limitations in terms of locations, company sizes and industries. In addition, the government policy fund was limited to the funding and public guarantee schemes for SMEs without holistic and extensive knowledge ability about government policy funds and their utilization. Likewise, the question items were far from extensive in respect to the government policy funds for SMEs. Moreover, this study has some limitations in establishing the consulting performance in line with the consulting support policy involving the policy funds and the KCGF. These limitations warrant further studies, which need to scale up the sample and develop more objective question items. Finally, further studies are required on the KCGF's consulting support policy associated with the government's implementation of policy funds for better performance.

## ACKNOWLEDGMENT

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# The Study on Consulting Performance Factors Centering on Consultant Competency and Recipients' Participation

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## Abstract---

**Background/Objectives:** Much research on consultant competency and consulting performance has been performed since management consulting started to be introduced in Korea. Consultant competency has been classified variously depending on researcher and measurement of performance has been conducted in many directions. The purpose of this study is to identify consultant's ability and attitude as core factors through literature review and previous studies and reveal the impact of consultant competency on consulting performance.

**Methods/Statistical Analysis:** Accordingly, this study first makes an empirical analysis of the impact of consultant competency on consulting performance. Next, it considers the theoretical background for the impact of recipients' participation on moderating effect regarding the impact of consultant competency on consulting performance and makes an empirical analysis of previous studies, etc.

**Findings:** To this end, it makes an empirical analysis of 123 companies which received consulting from the Korea Credit Guarantee Fund as guaranteed customers. As a result, it was found that consultant's ability and attitude, among consultant's competencies, had a positive (+) impact on consulting performance and recipients' participation had a moderating effect on the impact of consultant's ability and attitude on consulting performance.

**Improvements/applications:** This suggests that it is important for recipients to participate in the consulting process while reinforcing consultant's competency for improving the consulting performance.

**Keywords---** Consultant Competency, Consultant Ability, Consultant's Attitude, Consulting Performance, Recipients' Participation.

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## **I. BACKGROUND AND PURPOSE**

The National Statistical Office reported that as of the end of 2014, in the current status of Korea consulting industry, there were 7,118 businesses, 42,383 employees, and sales proceeds of 5.72 trillion won. Unlike this external aspect, Korea consulting industry still lacks awareness of consulting in small and medium-sized companies and is insufficient in terms of size and capital of consulting firms. Korea consulting industry has a marked difference in capital and size, consulting service quality, and international creditworthiness from global consulting firms. This is in part due to our domestic consulting industry's being in early stages, but above all, due to consulting industry's not obtaining international competitiveness as cutting-edge knowledge industry based on consultants' expertise and advanced management techniques. Most of the global companies which had entered Korea around IMF are now leading the world's management consulting market in the U.S., whereas domestic consulting industry remains petty centering on small and medium-sized companies. In the supply and demand of consultants, a key element for consulting, global companies are leading the management paradigm based on excellently talented people, but Korea consulting industry has omitted professional educational courses, many employees who changed their jobs from other types of business, and few people who entered the consulting industry immediately after college graduation, which led to the lack of expertise and experience and marginal alternative management techniques.

This situation forces the government to undertake to support consulting industry for activating knowledge service industry. The Small and Medium Business Administration introduced "coupon-based consulting" for reinforcing the competitiveness of small and medium-sized companies by fostering consulting industry and supporting consulting in 2005 to allow small and medium-sized companies to solve their overall management problems through management consulting at low cost. The Administration further introduced consulting graduate school for activating consulting and improving the quality of consulting service and spared no support to activate consulting industry as representative one in knowledge service industry including systematic support for fostering consultants. It reinforced its support for health management, sustainable growth, and acting as a proxy for business startup in the field of technology and venture business in 2015 and supported 30-65% of the consumed consulting cost up to 30 million won.

Many factors have caused this phenomenon, but what is important above all is that the reliability on the entire knowledge industry has not yet been formed and quality competitiveness has not been secured in consulting market among small and medium-sized companies. This is also due to the fact that consulting market has not yet taken its place in Korea because of not-long history of consulting, lack of competent consultants, lack of consulting techniques and expertise, and government-led consulting industry. Our urgent issues are to restore the original function of consulting in this consulting environment for small and medium-sized companies, provide them with quality consulting service, and contribute to improving the corporate competitiveness, original purpose of management consulting. To this end, it is above all important to identify which core factors are influential to the performance of management consulting for small and medium-size companies and improve the performance of consulting industry.

The most important factor in consulting industry is the competency of a consultant who performs and proceeds with consulting him/herself. Previous studies revealed that consultant competency is an important factor for improving the consulting performance. In this respect, the purpose of this study is to identify consultant's ability and attitude as core factors through literature review and previous studies and reveal the impact of consultant competency on consulting performance. Based on the previous study that consulting recipients' participation has a statistically significant impact on consulting performance, this study aims to identify the mediating effect of recipients' participation on consultant's consulting performance. By doing so, this study identifies the factors that may improve the competitiveness of domestic small and medium-sized companies in consulting industry and contribute to improving the quality level of domestic consulting industry.

## **II. THEORETICAL BACKGROUND AND PRECEDENT STUDIES**

This chapter understands the concept and definition of management consulting and reviews the literature and previous studies on management consulting performance factors, consultant competency factors, and recipients' participation. In the first place, regarding the concept of consulting, the Small and Medium Business Administration defines consulting industry (71531) as "and industrial activity that gives advice and support to other businesses about business administration issues" in the 9th revised version of Korea

standard industrial classification(KSIC) revised and enforced in 2008 and classifies it into general business consulting, strategic planning consulting, business consulting for a specific division, market management consulting, production management consulting, financial management consulting, and manpower management consulting<sup>1</sup>. In general, management consulting "presents substantial solving solutions so that professional consultants with professional knowledge and education in a particular field or area can find and solve problems in business administration and provides professional service to help such solutions to be conducted on time"(Management Consulting Engineers Association). Management consulting, representative type of knowledge service industry can be defined as intellectual activity to identify problems and seek solutions by the request of customers based on professional knowledge and experience in a particular industrial field.

This consulting industry is characterized by professionalism and business value, customer orientation and continuity, and environmental response<sup>2</sup>. Management consulting performance factors are part of management consulting service quality factor. The previous studies on this management consulting performance factors revealed only the service quality of management consulting performance. For this reason, there are few previous studies on the measurement of such performance. Most of the studies related to management consulting performance have been conducted on consulting means and consulting process for improving the profitability of consulting companies rather than performing consulting task successfully<sup>3</sup>. Kim<sup>4</sup> analyzed the structural influencing relationship between SMEs' characteristics, consulting firms' characteristics, satisfaction with consulting and utilization of consulting, and management performance for SMEs and found that SMEs' characteristics had an impact on consultant's ability and in turn consultant's ability had an impact on management performance for SMEs evaluated by Balanced Score Card. It was also found that satisfaction with consulting had an impact on utilization of consulting and both satisfaction with consulting and utilization of consulting were the factors that influenced the management performance of SMEs.

Previous studies on consultant competency had presented various opinions. Yun<sup>5</sup>, as regards consultant competency, presented 5 knowledge-related competencies, 7 skill-related competencies, and 5 attitude-related competencies and proved that among consultant competencies, consultant's ability and attitude had a positive (+) relationship with consulting performance. Jang<sup>6</sup> studied the impact of consulting competency on consulting service quality by dividing it into consultant's ability and attitude and found that among consultant's competencies, consultant's ability had a significant impact on service quality. Choi<sup>7</sup> classified consultant's capability to ability, sincerity, and consideration and Shin<sup>8</sup> defined consultant competency by classifying it into three categories: capability, knowledge, and attitude and found that capability had a positive impact on service quality.

In relation to recipients' participation, previous studies revealed that the top management's participation and support acted as important factors for management consulting performance and had a broad effect on the entire consulting<sup>9</sup>. Next, recipients' active participation acted as positive factor for improving consulting performance and customer's participation was identified as in-house consulting department's job performance and enthusiasm<sup>10</sup>. Thirdly, it was determined that recipients' advance preparation and planning would be necessary. Lee<sup>11</sup> classified consulting participation level into three categories based on the previous studies: first, whether recipients are aware of its problems exactly before receiving consulting, second, whether the management, including the top management participates in consulting positively, and finally, whether staff in charge of consulting as well as consultant are employed to operate the consulting department during the period of consulting<sup>12</sup>.

### **III. RESEARCH MODEL AND THEORETICAL DESIGN**

The purpose of this study aims to analyze the impact of consultant capability on management consulting performance, identify management consulting performance factors to contribute to improving management consulting performance, analyze the mediating effect of consulting recipients' participation on management consulting performance, and encourage recipients to participate in consulting for improving the management consulting performance.

Based on the previous studies, research model for empirical analysis was set and to identify the relevance between variables that constitute research model shown in figure 1, hypotheses were set, and operational

definition was made on constitutive variables to measure major theoretical concepts of research hypothesis set through questionnaire as measuring instrument.

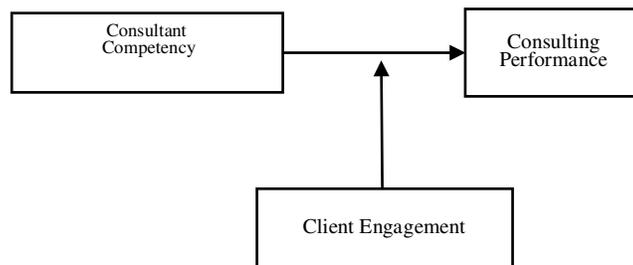


Figure 1: Research Model

This study identified the hypotheses through empirical analysis and set the following hypotheses based on the basic research model.

### A. Questionnaire Design and Contents Composition

Dependent variables used in this study were modified by referring to Choi<sup>7</sup> and Shin<sup>8</sup>'s questionnaires as consulting outcome and composed of six items [efficiency in budgets and schedules related to consulting project (4,5), customer's overall satisfaction(1), problem solving(3) and improving corporate value (6)]. Independent variables were first composed of five items regarding ability and attitude, among consultant capabilities by referring to Choi<sup>7</sup> and Shin<sup>8</sup>'s questionnaires. Ability item consisted of process management ability (1), problem diagnosis and analyzing ability (2,3), and presenting alternatives and predictive ability(4,5), and attitude item consisted of confidentiality and ethical compliance obligation (1,2,5). recipients' participation was composed of five items by referring to Lee<sup>11</sup>'s questionnaire and all items were based on Likert 5-point scale (1=it is not at all, 2=it is not so, 3=moderate, 4=it is so, 5=it is very so).

### B. Data Collection, etc

This study analyzed the copies of questionnaire collected from 123 companies at the national level to identify the consultant's capability and consulting performance and the mediating effect of consulting recipients' participation on consulting performance in small and medium-sized companies which received consulting from the Korea Credit Guarantee fund in the recent five years among the companies that had been guaranteed from the Korea Credit Guarantee Fund. To classify the small and medium-sized companies that had participated in questionnaire by type of business, number of employees, and input, it was found that in type of business, manufacturing was 42.0%, wholesale and retail sales 31.3%, and service industry 20.6% and in size of employees, 10-100 was 38.9%, 5 or less 35.9%, and 5-10 22.1%. As survey method, survey through email and direct investigation were combined. For statistical analysis, this study used SPSS version 21.

### C. Hypothesis

Hypothesis 1 : Consultant competency and consulting performance

This study set up the hypothesis that consultant capability would have an impact on consulting performance, on the premise from the previous studies that consultant capability would have a statistically significant impact on consulting performance.

H1-1. Consultant competency will have a positive (+) impact on consulting performance.

H1-2. Consultant's attitude will have a positive (+) impact on consultant's attitude.

Hypothesis 2 : Moderating effect of recipients' participation on consulting performance

This study set up the hypothesis that recipients' participation would have a mediating effect on the impact of consultant ability and attitude on consulting performance, on the premise from the previous studies that recipients' participation would have a statistically significant impact on consulting performance.

H2-1. Recipients' participation will have a mediating effect on the impact of consultant ability on consulting performance.

H2-2. Recipients' participation will have a mediating effect on the impact of consultant's attitude on consulting performance.

#### IV. EMPIRICAL ANALYSIS

##### A. Validity Analysis

This study defined consultant capability as independent variable and consulting performance as dependent variable and intended to first conduct validity and reliability analysis of variables and when validity and reliability were obtained, carry out correlation analysis and multiple regression analysis of these variables shown in table 1..

Table 1: KMO and Bartlett Test

Kaiser-Meyer-Olkin sampling adequacy	.900
Bartlett's sphericity testing approximate chi-square	1240.511
Degree of freedom	45
Significant probability	.000

Kaiser-Meyer-Olkin(KMO) value, which represents the explanatory degree by the variables with different correlations between the variables related to consultant capability as independent variable was 0.900, which was over 0.7, which indicates general level and Bartlett's sphericity testing, which identifies if the correlation matrix is a unit matrix was significant probability of .000, which suggested that KMO and Bartlett's sphericity testing results are valid as shown in table 2.

Table 2: Summary of Validity Analysis

Classification	Components		
	Ability	Attitude	Commonality
Consultant ability 1	.845	.391	.866
Consultant ability 2	.890	.302	.883
Consultant ability 3	.845	.416	.887
Consultant ability 4	.896	.286	.884
Consultant ability 5	.765	.410	.754
Consultant attitude 1	.258	.804	.714
Consultant attitude 2	.424	.797	.815
Consultant attitude 3	.374	.797	.775
Consultant attitude 4	.424	.769	.771
Consultant attitude 5	.232	.729	.586
Basic eigen value	4.228	3.706	
% variance	42.282	37.062	-
% accumulation	42.282	79.344	

In this study, the entire items related to measurement variables were adopted through scale purification process without item removal. First, for validity verification, exploratory factor analysis was conducted. To extract constitutive factors from all measurement variables, principal component analysis was used, and to simplify factor loading values, orthogonal rotation method (varimax) was adopted. Also, eigen value refers to the sum of squared values of loadage of all variables loaded in a particular factor and thus standardized variance related to a particular factor.

In this study, as selection criteria for items, eigen value was over 1.0 and factor loading value over 0.4. On the other hand, % cumulative value, the loading value of rotation sum of squares representing total variance that is accounted for by two factors was 79.3%, which exceeds 60%, general level and two factors account for total variance sufficiently. As a result of analyzing the rotated component matrix using orthogonal rotation method (varimax), factor loading values of each factor, in other words, consultant's ability (.845, .890, .845, .896, .765) and consultant's attitude (.804, .797, .797, .769, .729) are over 0.5, general level and commonalities exceed 0.4, general level, which suggests that validity is obtained.

**B. Reliability analysis**

The results of reliability analysis on consultant’s ability and attitude, two independent variables are shown in Table 3. To look at the reliability analysis on questionnaire item by variable, Cronbach’s alpha was .955 and .906, respectively, which exceeds 0.7, general level and this suggests that reliability is obtained, and if items are deleted, Cronbach’s Alpha is below Cronbach’s Alpha by variable, which suggests that such procedure as item removal isn’t necessary.

Table 3: Summary of reliability analysis (independent variable)

Classification	Questionnaire item	Cronbach’s α, if item is deleted.	Cronbach’s α, by variable
Consultant ability	Ability 1	.941	.955
	Ability 2	.942	
	Ability 3	.940	
	Ability 4	.941	
	Ability 5	.958	
Consultant attitude	Attitude 1	.890	.906
	Attitude 2	.868	
	Attitude 3	.874	
	Attitude 4	.876	
	Attitude 5	.911	

On the other hand, as a result of analyzing the reliability on consulting performance, dependent variable, Cronbach’s Alpha is .955, which exceeds 0.7, general level by variable as shown in Table 4 and this suggests that reliability is suggested, and if items are deleted, Cronbach’s Alpha is below Cronbach’s Alpha by variable, which suggests that such procedure as item removal isn’t necessary.

Table 4: Summary of reliability analysis (dependent variable)

Classification	Questionnaire item	Cronbach’s α, if item is deleted.	Cronbach’s α, by variable
Consulting performance	1	.905	.922
	2	.919	
	3	.910	
	4	.915	
	5	.900	
	6	.898	

**V. VERIFICATION OF RESEARCH HYPOTHESIS**

As a result of identifying the VIF value to diagnose the multicollinearity of independent variables to identify the goodness-of-fit of the regression model for independent and dependent variables, all were 10 or less and indicated Durbin-Watson’s 2.047, which is closer to 2 and not closer to 0 or 4 as shown in table 5. This allows us to interpret that there is no correlation between residuals, which can be understood that regression model is appropriate.

The correlation between independent and dependent variables is 0.741, which is a rather high correlation. And  $R^2 = .591$ , which suggests that consultant’s capability, dependent variable accounts for consulting performance, dependent variable by 59.1% as shown in table 6.

Table 5: Model Summary

Model	R	R <sup>2</sup>	modified R <sup>2</sup>	standard error of estimated value	Dubin-Watson
1	.769 <sup>a</sup>	.591	.585	.49053	2.047

- a) predictive value: (constant) consultant’s attitude, consultant’s ability
- b) dependent variable: consulting performance

Table 6: Variance Analysis

	sum of squares	df	mean square	F	significant probability
regression model	41.804	2	20.902	86.867	.000 <sup>b</sup>
residual	28.874	120	.241		
total	70.678	122			

a. dependent variable: consulting performance

b. predictive value: (constant), consultant's attitude, consultant's ability

F is 86.867 and significant probability .000(p<.05), which suggests that one of the independent variables has a significant impact on dependent variable as shown in table 7.

Table 7: Coefficient

	non-standard coefficient	standard coefficient	t	significant probability	Multi collinear statistic	
	B	beta			allowance	VIF
(constant)	.685		2.572	.011		
Consultant's ability	.402	.467	5.811	.000	.528	1.895
Consultant's attitude	.385	.370	4.601	.000	.528	1.895

a. dependent variable: consulting performance

Hypothesis 1-1 and 1-2 shows final results. As a result of analysis, consultant's capability had a positive (+) impact on management consulting performance. Consultant's ability t was adopted at 5.811 and p at .000 and thus hypothesis 1-1 was adopted. Consultant's attitude t was adopted at 4.601 and p at .000 and thus hypothesis 1-2 was adopted.

t value suggested that consultant's ability had the biggest impact on management consulting performance and that consultant's attitude did, too.

Table 8: Model Summary

Model	R	R <sup>2</sup>	Statistical Change				
			R <sup>2</sup> variation	F variation	df 1	df 2	Probability F variation
1	.721 <sup>a</sup>	.515	.519	130.761	1	121	.000
2	.793 <sup>b</sup>	.623	.110	35.683	1	120	.000

a: predictor variable: (constant), consultant's ability

b: predictor variable: (constant), consultant's ability, capability control

c: dependent variable: consulting performance

To look at R square in the model that as shown in hypothesis 2-1 regarding recipients' participation, consultant's ability would have a mediating effect on consulting performance, model 1 increased by 51.5% and model 2 by 62.3% as shown in table 8. Here, significant probability F variance in stage 2 appeared at 0.000. As it was less than 0.05, it meant that it increased significantly at the level less than significant level. Therefore, recipients' participation was found to have a moderating effect on the impact of consultant's ability on management consulting performance.

Table 9: Model Summary

Model	R	R <sup>2</sup>	Statistical Change				
			R <sup>2</sup> variation	F variation	df 1	df 2	Probability F variation
1	.690 <sup>a</sup>	.476	.476	110.134	1	121	.000
2	.749 <sup>b</sup>	.560	.084	22.921	1	120	.000

a: predictor variable: (constant), consultant's attitude

b: predictor variable: (constant), consultant's attitude, attitude control

c: dependent variable: consulting performance

To look at R square in the model that as shown in hypothesis 2-2 regarding recipients' participation, consultant's attitude would have a moderating effect on consulting performance, it was suggested that model 1 increased by 47.6% and model 2 by 56.0% as shown in table 9. Here, significant probability F variance in stage 2 appeared at 0.000. As it was less than 0.05, it suggested that it increased significantly at the level less than significant level. Therefore, recipients' participation was found to have a moderating effect on the impact of consultant's attitude on management consulting performance.

## **VI. CONCLUSION**

### **A. Summary of Analysis Result**

This study made an empirical analysis of the consultant capability as factor that influences consulting performance and the moderating effect of the impact of recipients' participation, especially consultant capability on management consulting performance in credit guarantee-using customers among the domestic small and medium-sized companies which received consulting by the support of the Korea Credit Guarantee Fund. Consultant's capability was divided into ability and attitude and the influencing relationship was identified and for each sub-factor, recipients' moderating effect was empirically analyzed. As a result of analysis in this study, the following conclusions could be drawn. First, consultant ability, among consultant capabilities had a statistically positive (+) impact on consulting performance. Second, consultant's attitude, among consultant capabilities had a statistically positive (+) impact on consulting performance. Also, recipients' participation had a moderating effect on the impact of consultant ability on consulting performance. Finally, recipients' participation, especially consultant's attitude had a moderating effect on the impact of consultant's attitude on consulting performance.

### **B. Theoretical and Practical Suggestions**

Taken together, the following theoretical suggestions could be drawn. As shown in the previous studies, domestic management consulting in small and medium-sized companies is not competitive for various reasons from the consulting firms' perspective and autonomous management consulting cannot be received easily yet from recipients' perspective as well. Consulting industry for SMEs has been steadily growing by the government's continuous policy support, but now it is important to obtain competitiveness to ensure internal stability rather than external growth. To this end, what is important is to obtain consultant's capability, one of the core competitiveness in consulting industry. As verified in this study, to improve the quality of consulting performance, consultant's capability, in other words, consultant's ability and attitude needs to be improved to take multifaceted countermeasures. It is consultants who can obtain global competitiveness as core of knowledge service industry, convey new management techniques to SMEs, and support national economy in this consulting industry. The future of domestic consulting industry lies in how these consultants can be obtained and transformed into competitive assets in this poor management environment.

Also, consulting cannot obtain good results simply by consultant's efforts. Recipients who hoped to receive consulting must have an accurate and clear sense of purpose from the top management to staff in charge of consulting and participate in consulting actively and positively to obtain desired results. recipients' active participation can obtain good results by improving consultant's ability and attitude. Also, it is necessary to reinforce requirement and screening for consulting recipients in order to improve the government-led consulting performance for SMEs. In other words, recipients' needs for consulting should be reviewed closely, recipients' voluntary preparation and planning must be identified and supported preferentially to improve consulting. To this end, government-led appropriate promotions and policies on consulting industry should be combined.

### **C. Limitations and Future Directions**

Despite the theoretical and practical suggestions above, this study has the following limitations. There are some limitations in subjects of questionnaire and sample setting for questionnaire. This study has limitation in that it limits the subjects of questionnaire to guaranteed customers by the Korea Credit Guarantee Fund and also in that the number of subjects does not attain a certain standard. It also has limitation in sample setting for questionnaire in terms of region, scale, or type of business. Also, capability itself cannot be identified comprehensively by simplifying into ability and attitude in evaluating consultant's capability and measurement of consulting performance and that of recipients' participation as well are insufficient for overall and comprehensive survey as it simplifies questionnaire items. This also has limitations in identifying

consultant's capability and performance and recipients' participation. Further studies need to expand the subjects of sample setting by complementing the above limitations and develop the items that can secure higher objectivity in questionnaire items. Furthermore, it is necessary to examine how to secure consultant's capability to improve the consulting performance and concrete methods to draw recipients' participation.

## ACKNOWLEDGMENT

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# An Empirical Study of Influential Factors to Global Business Strategy of Korean SMEs in the Era of Multi-FTAs and Mega-FTAs: Focusing on China and Vietnam

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## Abstract---

**Background/Objectives:** The central goal of this paper is to address the question of which factors of FTA utilization in the era of multi-FTAs and Mega-FTAs influence global business strategy of Korean SMEs.

**Methods/Statistical Analysis:** First, this study conducted a factor analysis in order to extract the factors that influence Korean SMEs' global business strategy. Second, a multiple regression analysis was performed to see which factors in FTA utilization affect global business competences and global investment. Cronbach's Alpha index would show the internal consistency among the measurement items and the reliability of each scale.

**Findings:** First, it was found that Korean SMEs, with global business presence amongst Korean, China, and Vietnam, have implemented global business system and are struggling to be equipped with the best global value chain system under dynamic business environment spanning several countries, regardless of the business size and globalization history. Second, it was found that, in FTA utilization corporate external factors analysis of Korean SMEs, both FTA preferential tariffs and trend towards Mega-FTAs system influence to strengthen global business competences positively. Third, it was found that FTA rules-of-origin influences global investment negatively, whereas FTA preferential tariffs influence global investment positively. Fourth, in FTA utilization corporate internal factors analysis of Korean SMEs, global experience was proved to influence to strengthen global business competences positively; however, both management's commitment-to-FTA and FTA information acquisition capability were verified not to influence to strengthen global business competences. Fifth, globalization experience of Korean SMEs makes the strongest positive impact to increase global investment, and both FTA information acquisition capability and management's commitment-to-FTA positively influence to increase global investment.

**Improvements/Applications:** It is expected that further study of foreign direct investments into developed countries such as US and EU would provide much comprehensive understandings about going-global and expanding-global-value-chain by Korean SMEs.

**Keywords---** Free Trade Agreement, Mega-FTA, Small & Medium-Sized Enterprise, Global Business Competences, and Global Value Chain.

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## I. INTRODUCTION

Over the past 10 years, more than 300 FTAs (Free Trade Agreements) have been negotiated and/or implemented across the globe, and trend towards mega-FTAs is recently emerging as new protocol in global trade and political economy.

The globe, during considerable period, has been skeptical to the success of TPP (Trans-Pacific Partnership) even when US announced to join the negotiations for a mega-FTA including Japan, Korea, and ASEAN; on the contrary, it did not took long until the doubt changed into awe, as US, Japan, and other 10 countries came to an agreement on 5 October 2015 and signed on 4 February 2016, with the pressure to non-members of TPP such as China and Korea.

Reflecting global trend in regional economic integration, multi-lateral organizations like GATT or WTO opened the discussion about economic integration, by giving a way to bi-lateral free trade agreements since end of 1990s, which demonstrates the confidence that bi-lateral economic integration provides participants with the cut down in regional transaction costs and economic benefits. However, as increasing numbers of bi-lateral agreements are signed, the benefits from preferential treatment gradually decrease and transaction costs arising from complicated rules of origins increases to the contrary. So-called "spaghetti bowl effect, or noodle bowl effect",<sup>1</sup> which lead to paradoxical, and often contradictory outcomes amongst bilateral trade partners, triggers increasing numbers of countries to consider the pros and cons of multi-lateral negotiations.

Changes in the global trade environment calls for new global business strategy to adapt to environmental changes in business.

For instance, not a few Korean SMEs, expecting the advent of G2-era and consequently huge business potentials in China, have increased the direct investment into China long before Korea-China FTA came into force. For those companies, as China's expected growth rate gets lower and the advent of TPP, which allegedly aims to hold China's economic power in check, becomes a reality, current changes in global business environment put pressure to adjust FTA utilization and global business strategy accordingly.

On the other hand, Vietnam is emerging as one of alternatives to Korean SMEs in their global business competences and investment.

Korea has been ranked the largest foreign direct investor to Vietnam since 2014, and Korea's cumulative FDI to Vietnam during 2011 to 2015 has reached U\$44.9 billion, surpassing Japan (U\$38.4 billion) and Singapore (U\$34.7 billion). In 2015, Korea exported U\$27.6 billion to Vietnam by taking the 2nd place next to China, accounting for 16.7% of total imports by Vietnam.<sup>2</sup>

Led by strategic investments by Samsung Electronics and LG, increasing numbers of Korean SMEs have spurred to upgrade their global value chain strategy in both competences and investment: more than 87.9% of total investment to Vietnam since 19881 has been focused on manufacturing and processing area. Even falling short of formerly executed investment onto China in scale, the newly strengthening trend of FDI to Vietnam is enough to denote that Korean SMEs have already started checking their traditional FTA utilization strategy and global business strategy. Trend towards mega-FTAs, signaled by the settlement of TPP the negotiations of RCEP, may work as a trigger for decision-making in global investment strategy in terms of global value chain system.

In this context, this research shall review FTA utilization strategy under new trend towards mega-FTAs and shall study the implications to Korean SMEs in their global business strategy.

## II. LITERATURE REVIEW

### A. *Concept and Economic Impacts of Mega-FTAs*

Mega-FTA is defined as the free trade agreement amongst multi countries aiming to relax trade-related regulations. Some regard mega-FTA as a complex combination of bilateral FTAs; however, it is rather closer to a regional trade agreement in that mega-FTA is settled amongst cultural and regional neighborhood countries.

The nature of mega-FTA, stemmed from large scale and intricately intertwined interests among diverse countries, hinders the agreement from balancing the detailed interests of the participating countries simultaneously.

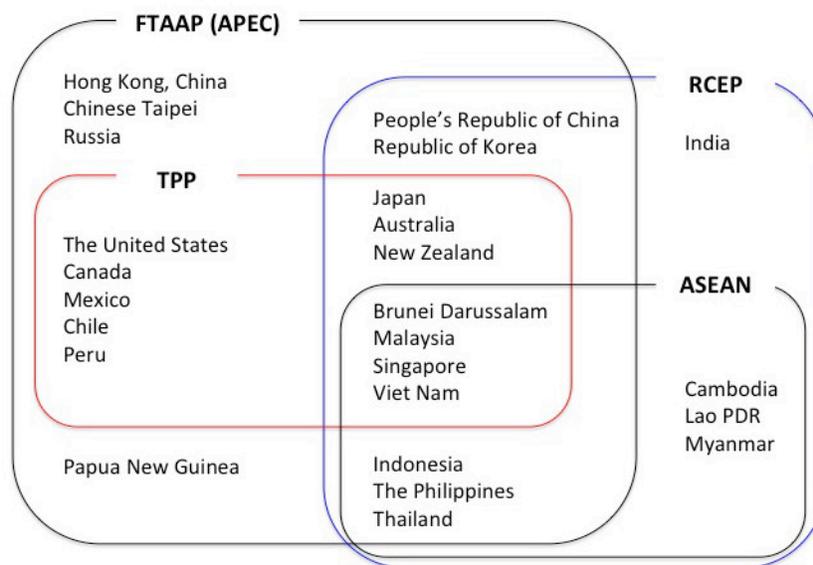


Figure 1: Major Mega-FTAs Settled or Under Negotiations

Figure 1<sup>3</sup> shows major mega-FTAs and the complexity surrounding them: TPP (Trans-Pacific Partnership), RCEP (Regional Comprehensive Economic Partnership), ASEAN, and FTAAP (Free Trade Area of the Asia Pacific). Major mega-FTAs mainly focus on Asia and Pacific area, which is expected to fastest grow in coming years. Singapore, Malaysia, Vietnam, and Brunei are affiliated to all of major mega-FTAs. The complex structure and various interests of participating countries show well why the negotiations speed of mega-FTAs lag so much behind that of bilateral FTA. For instance, China-ASEAN FTA, which started negotiations on November 2000, saw the settlement on November 2004 after 4 years of arbitrations, whereas TPP, which had stemmed from P3 CEP (Pacific Three Closer Economic Partnership) initiated by New Zealand, Singapore, and Chile, had to await as long as 13 years until the settlement on October 2015.

TPP, after ratification by 12 countries, is expected to grow up to a mega economic block accounting for 800 million of population (11% of total), U\$27.7 trillion of GDP (38% of total), and a fourth of global trade annually.<sup>4</sup> TPP means beyond merely the largest economic block in its implications. US is reported to be leveraging TPP to create new global standard in terms of labor, environmental regulations, e-commerce, and intellectual property, to confine China to US-led global trade order, and, in the long run, to create a springboard to retain its global economic hegemony. Japan is also considered another winner in that it can expect additional growth of automobile and the manufacturing sectors. In this regards, global media evaluated the deal as "another big win for Mr. Obama and Mr. Abe."<sup>5</sup>

According to USTR (2015), TPP agreement features prominently in comprehensive market access, regional approach to commitments, addressing new trade challenges, inclusive trade including special effort to help small and medium-sized businesses understand the Agreement. TPP agreement includes 30 chapters: Initial Provisions and General Definitions, Trade in Goods, Textiles and Apparel, Rules of Origin, Customs Administration and Trade Facilitation, Sanitary and Phyto-sanitary Measures, Technical Barriers to Trade, Trade Remedies, Investment, Cross-Border Trade in Services, Financial Services, Temporary Entry for Business Persons, Telecommunications, Electronic Commerce, Government Procurement, Competition Policy, State-Owned Enterprises and Designated Monopolies, Intellectual Property, Labour, Environment, Cooperation and Capacity Building, Competitiveness and Business Facilitation, Development, Small and Medium-Sized Enterprises, Regulatory Coherence, Transparency and Anti-Corruption, Administrative and Institutional Provisions, Dispute Settlement, Exceptions, Final Provisions.<sup>6</sup>

RCEP(Regional Comprehensive Economic Partnership), considered an alternative to the TPP agreement where China and Korea is excluded, is a proposed mega-FTA between 10 ASEAN member countries and 6 countries with which ASEAN has settled FTAs such as China, Korean, Japan, India, Australia, and New Zealand. RCEP negotiations were formally launched in November 2012 at the ASEAN Summit. RCEP agreement is expected to account for U\$21.6 trillion of GDP, less than that of TPP; however, 3.4 billion of population will cover U\$10.6 trillion of global trade surpassing that of TPP.<sup>7</sup>

Full-scale opening boosts convergence of products and technologies between member countries participating in Mega-FTAs, which accordingly improve external competitiveness of the countries by fostering innovation and lowering a productivity gap between them. This implies Mega-FTAs can be advantageous to some countries that are at a low level of technology but in possession of production competitiveness, relative low wages, and global supply chain.

In addition, Mega-FTAs can stimulate global restructuring for industrial supply chains by establishing a unified production system. For example, it is anticipated that a global supply chain in textile and garment industry is intensified at the basis of Vietnam after TPP is officially launched. Such anticipation is based on the scenario that non-member countries of TPP, such as South Korea, China, and Taiwan, will increase upstream investment to Vietnam to fulfill TPP’s criteria on place of origin, which can result in the establishment of a unified production system in Vietnam.<sup>8</sup> In case of tire industry, while antidumping tariffs of 35% are effective to US export, Vietnam-made products can be away from this regulation so many companies running factories in China will consider reordering of investment priority after the activation of TPP.

**B. Korean SMEs and Global Business**

In Korea, SMEs (Small and Medium Enterprises), in general, are defined as the companies hiring less than 300 employees, and the details such as total assets, paid-in capital, revenue, and etc. are regulated by “Small and Medium Enterprises Act”. SMEs account for 99.9% in terms of corporate units and 87.7% in employment (13,059,372 persons), and the employment by SMEs has increased for the last 10 years as shown in Table 1.

Table 1: Korean SMEs’ Contribution to National Economy

		1994		2012		Increase ('02-'12, %)	Contribution Ratio (%)
		Number	%	Number	%		
Number of Corporates	Total	2,382,571	100	3,354,320	100	492,490	100
	SMEs	2,365,318	99.3	3,351,404	99.9	494,491	100.4
	Large Companies	17,253	0.7	2,916	0.1	(2,001)	(0.4)
Number of Employees	Total	10,217,910	100	14,891,162	100	3,153,522	100
	SMEs	7,677,089	79.5	13,059,372	87.7	2,905,277	92.1
	Large Companies	2,540,821	20.5	1,831,790	12.3	(248,245)	7.9

Note: Contribution Ratio means the percentile contribution to the total increase amount

Data: Korea Federation of SMEs, “SME Status Indicators (2014.5.), pp.18-19.

Table 2 shows that SMEs’ contribution in exports has been stagnant during 2006-2012, which is attributed to the global economic crisis in 2008 when the exports plummet to the level of 2006. SMEs’ export has bounced back to 2006 level only when 2012.

SMEs, in manufacturing, account for 47.6% in turnover and 50.5% in corporate added value. In services, it takes up to 79.1% in turnover and 81.9% in corporate added value. SMEs account for 87.5% of total corporate units.<sup>9</sup>

Table 2: Korean SMEs’ Contribution to Export

	(US\$ billion, %)							
	2006	2007	2008	2009	2010	2011	2012	CAGR (%)
Total Export	325.5	371.5	422	363.5	466.4	555.2	547.9	21.8%
SMEs’ Export	103.7	113.5	130.5	76.8	98.6	101.6	102.9	(0.05%)
(%)	31.9	30.6	30.9	21.1	21.1	18.3	18.8	

Data: Korea Federation of SMEs, “SME Status Indicators” (2014. 5.), pp.67.

Both Table 3 and 4 shows that SMEs' contribution in foreign direct investment outbound in terms new corporate body and investment amount during 2007-2013. SMEs account for 45.2% in new corporate unit and 17.3% in investment amount during the same period cumulatively. Remarkably, SMEs' investment amount went up to about 1.5 times from U\$3.1 billion in 2009 to U\$4.6 billion in 2013, overcoming shocking plunge in 2008-2009.

Discordance between new corporate unit (45.2%) and investment amount (17.3%) denotes that investment of large corporates has recovered up to former level, whereas SMEs has comparatively lagged far large corporates in investment power since 2008 economic crisis.

Table 3: Korean SMEs' Contribution to Outbound FDI - New Corporate Unit

	2007	2008	2009	2010	2011	2012	2013	Total (Unit, %) ( '07-'13)
New Corporate Body	6,071	4,292	2,684	3,056	2,943	2,756	2,928	24,730
SMEs	2,479	1,973	1,290	1,407	1,351	1,238	1,448	11,186
(%, SMEs)	40.8%	46.0%	48.1%	46.0%	45.9%	44.9%	49.5%	45.2%

Data: Korea Federation of SMEs, "SME Status Indicators (2014.5.), pp.74.

Table 4: Korean SMEs' Contribution to Outbound FDI - Investment Amount

	2007	2008	2009	2010	2011	2012	2013	Total (U\$ billion, %) ( '07-'13)
Total Investment <sup>2</sup>	22.7	24.1	20.5	24.6	27.8	25.4	24.1	169.2
SMEs Investment	5.4	5.6	3.1	3.3	3.9	3.4	4.6	29.3
(%, SMEs)	24.4	23.3	15.1	13.5	14.1	13.7	19.1	17.3%

Data: Analyzed by the author based on the dat from Korea Federation of SMEs and Korea EXIM

Bank.

Table 5 shows the outbound FDI by country. In both Netherland and Vietnam, SMEs account for 46.8% and 58.0% respectively. Small and medium sized trading companies have invested in Netherland for tax benefits, whereas Vietnam is reported to attract most of production facilities transferred from both Korea and China.

Table 5: Korean SMEs' Outbound FDI - Top 5 Target Countries

Place	Country	Total Investment	SMEs' Investment	(U\$ billion, %) (% of SMEs)
1st	China	50.5	6.3	12.5
2nd	U.S.	34.3	7.7	22.5
3rd	Australia	30.0	2.4	12.0
4th	Netherland	15.6	7.3	46.8
5th	Vietnam	11.2	6.5	58.0

Note: Top 5 investment countries based on the accumulative investment amount by Korean large corporates and SMEs (as of December 2013)

Data: Korea EXIM Bank (2014)

Corporate's globalization, prioritized in a dimension of management, means the process that a corporate increases the degree of involvement of the global markets and expands the growth opportunities from domestic market to global one, through the action of resource transfer abroad to enlarge the range of market based on the resources it retains.<sup>10</sup>Lee(2005)<sup>11</sup> analyzed the motives of SMEs' globalization as coping with the challenges from foreign competitors, defending market share in global markets, cutting costs by accessing to cheaper production factors, overcoming tariff barriers, and securing benefits by exercising technical superiority.

As discussed above, Korean SMEs are less developed in global business capability than conglomerates considering their significant contribution to employment and export. First of all, since they are vulnerable in financial resource, technical background, information, experience and management ability, their accomplishments in global business showed a considerably low level compared to conglomerates.

Manufacturing industry can be classified into supplier-dominated, specialized supplier, scale-based, and science-based domains according to technical innovation features (Pavitt 1984). The research proposed that innovation is mainly contributed by conglomerates in scale-based domain, by ventures, universities, and conglomerates in science-based domain, by SMEs in specialized supplier domain, by component and material companies in supplier-dominated domain. Johnson and Mattson (1988), based on both the globalization level of the company and the international network level, classified companies in four groups: the early starter, the later starter, the lonely international, and the international amongst others.

Currently, South Korea's SMEs constantly play a role of a specialized supplier by participating in conglomerates' scale-based global investment as 1st, 2nd, and 3rd suppliers. For instance, SMEs jointly invested in global sites as a part of global value chain which was organized by Samsung Electronics and LG Electronics when they invested billions dollars in the establishment of a Vietnam mobile factory and an electrical appliance factory. The companies, evaluated as the International Amongst Others level suggested by Johnson and Mattson, have made a consistent growth in China and Vietnam based on the successful strategy.

### **C. FTA Utilization and Impacts on Korean SMEs**

First of all, transition into multi-FTAs system, and following openness to global markets, may provide Korean SMEs with the opportunities to switch trading partners in both sourcing subsidiary materials and exporting finished goods for better conditions because FTA is to offer benefits of lowered tariffs and tariff exemption. For example, the most positive effect in the Korea-EU FTA is evaluated as the creation of a new opportunity to change Japanese and US import partners, highly dominating in import of high value added machinery and equipment, to EU partners.

Second, FTA can provide an opportunity for regional SMEs to join in global markets by establishing cooperative relation with multinational companies because they have advantages in onsite information more than overseas companies.

This fact is based on a localization tendency of overseas companies which generally struggle to raise their awareness as well as to adapt themselves in operational countries or regions.

Third, regional SMEs can benefit from expanded opportunities to grow into global companies by raising competitiveness through originality in specific areas such as IT or Biotechnology.

Lastly, SMEs can have more opportunities to establish niche markets and an independent business area in specific industries, which are labor-oriented or difficult for conglomerates or multinational companies to manage. Globalization through FTA is possibly an opportunity of global market entry to SMEs that produce regional specialties such as handicraft.

On the other hand, there are threats to SMEs under FTA Systems. First, SMEs are disadvantageous in establishment of business strategies due to the lack of professional human resources for investigating and analyzing global economic information in relevance of FTA, which can cause the worst scenario of collapse.

Second, SMEs can experience loss in preferential tariffs because they cannot apply due to the spaghetti bowl effect and FTA's complicated and strict regulations on place of origin according to the types of product. Additionally, they can be imposed with tariffs by failing to fulfill the regulations on place of origin. This possibly causes a serious burden to SMEs with insufficient financial resources and increases risk to fail in their market adaptation.

Third, the control by large firms or MNCs can induce disadvantages to SMEs in global value chain system where they are consistently enforced to be dominated by the controllers.

Forth, although SMEs might possess an ability to accomplish a higher quality of products, they can be under a situation to lose chances by failing in keeping on track with global demand. This limitation is based on the fact that SMEs are incapable of fulfilling global wholesale dealer's bulk demand because they do not afford to run economies of scale that operates production lines with subcontractors in a large scale.

### **III. PROPOSED WORK**

#### **A. Research Questions**

Research Question 1. Corporate external factors in FTA utilization will have a positive(+) influence to strengthen global business capability.

Research Question 2. Corporate external factors in FTA utilization will have a positive(+) influence to increase global investment.

Research Question 3. Corporate internal factors in FTA utilization will have a positive(+) influence to strengthen global business capability

Research Question 4. Corporate internal factors in FTA utilization will have a positive(+) influence to increase global investment.

#### **B. Research Methods**

##### **Measurement Tools**

Measurements for management's commitment to FTA as FTA utilization internal factor adopt the approach in advanced studies (Shamsudoha and Ali, 2006), operationally redefine them in accordance with the purpose of this research.

Surveyed questions are (1) The Chief Executive is interested and willing to open up overseas markets through FTA utilization,(2) The Chief Executive assigns personnel and appropriate budget to set up the system for FTA utilization,(3) The Chief Executive is interested and willing to provide FTA representatives with HR and/or financial incentives.

Measurements for FTA information acquisition capability as FTA utilization internal factor adopt the questionnaires in advanced studies(KITA Survery, 2008; Yli-Renko, Autio, and Tontti, 2002<sup>12</sup>), operationally redefine them in accordance with the purpose of this research. Surveyed questions are (1) The company has sufficient capability to acquire information about the tariff elimination and/or reduction of FTA counterparts,(2) The company has sufficient capability to acquire information about the criteria and procedures of rules of origin determination of FTA counterparts,(3) The company has sufficient capability to acquire information about the origin verification procedure of the FTA counterparts (Cronbach's Alpha=.915).

Measurements for globalization experience as FTA utilization internal factor adopt the questionnaires in advanced studies(Lee, 2005)<sup>13</sup>, adjust and redefine them operationally in accordance with the purpose of this research. Surveyed questions are (1) The company holds higher level of globalization experience accumulated through global value chain system, strategic alliance, or global investment (whether direct or indirect) activities,(2) Company's globalization experience shall lead to much FTA utilization efforts, (3) Company's globalization experience shall lead to better FTA utilization performance (Cronbach's Alpha=.915).

Measurements for strengthen global business competences adopt the approach in advanced studies (Morgan et al., 2004<sup>14</sup>; Lee, 2006), operationally redefine them in accordance with the purpose of this research. Surveyed questions are (1) To win global competition, the corporate will strengthen global business competences by integrating global value chain in sourcing raw and/or subsidiary materials,(2) The corporate will strengthen global business competences by integrating global value chain in in production system, (3) The corporate will strengthen global business competences by integrating global value chain in marketing and sales(Cronbach's Alpha=.915).

Measurements for increase global investment adopt the approach in advanced studies(Morgan et al., 2004; Lee, 2006), operationally redefine them in accordance with the purpose of this research. Surveyed questions are (1) To maximize FTA utilization performance and overcome global competition, the corporate will make new investment in new countries within coming 3-5 years,(2) To maximize FTA utilization performance and overcome global competition, the corporate will make reinvestment in the current overseas business, (3) To maximize FTA utilization performance and overcome global competition, the corporate will conduct divestment from the current overseas business(Cronbach's Alpha=.915).

**Analysis Methods**

This study conducted factor analysis to check the construct validity of the corporate external factors in FTA utilization, corporate internal factors in FTA utilization, and global business strategy factors. Factor analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. To identify meaningful process by reducing and compressing variables, principal component analysis, orthogonal rotation of VARIMAX, Kaiser-Meyer-Olkin measurements, and Bartlett’s feature configuration validation were checked. Factor extraction was deemed valid if (a) Eigen value is equal to or bigger than 1, (b) load factor is equal to or bigger than 0.4(Hair et al., 2006)<sup>15</sup>, and (c) commonality is equal to or bigger than 0.4(Field, 2000)<sup>16</sup>.

To identify which one of FTA utilization external factors and internal factors influences to ‘strengthening global business competences’ and/or ‘increasing global investment’, this study also conducted multiple regression analysis in the Enter method. Regarding the reliability of each factor, Cronbach’s Alpha coefficient was also confirmed to check the internal consistency among the items that make up the variables. Out of ‘Increase Global Investment’ items, ‘To maximize FTA utilization performance and overcome global competition, the corporate will conduct divestment from the current overseas business’ was conversely coded in the analysis. SPSS 20.0 for Windows program was used for the analysis.

**IV. CONCLUSION**

**A. FTA Utilization External Variables and ‘Strengthen Global Business Competences’ (Research Question 1)**

Multiple regression analysis was conducted to see how ‘FTA Rules of Origin’, ‘FTA Preferential Tariff’, and ‘Trend towards Mega-FTAs System’ as corporate external factors in FTA utilization influence on ‘Strengthen Global Business Competences’ respectively as seen in Table 1. As a result of regression analysis, both ‘FTA Preferential Tariff’ and ‘Trend towards Mega-FTAs System’ were proved to influence to ‘Strengthen Global Business Competences’ positively. In detail, ‘FTA Preferential Tariff’ has stronger impacts on ‘Strengthen Global Business Competences’ than ‘Trend towards Mega-FTAs System’ does. However, ‘FTA Rules of Origin’ was verified not to influence to ‘Strengthen Global Business Competences.’

Table 6: Regression Analysis of Corporate External Factors in FTA Utilization and Strengthen Global Business Competences

Model	Unstandardized Coefficient		Standardized Coefficient	t	Significance Probability
	B	Standard Error	Beta		
FTA Rules of Origin	-.023	.076	-.023	-.299	.765
FTA Preferential Tariff	.643	.075	.702	8.624	.000
Trend towards Mega-FTAs System	.273	.083	.249	3.285	.001
F=27.946, P<.001					

**B. FTA Utilization External Variables and ‘Increase Global Investment’ (Research Question 2)**

Multiple regression analysis was conducted to see how ‘FTA Rules of Origin’, ‘FTA Preferential Tariff’, and ‘Trend towards Mega-FTAs System’ as corporate external factors in FTA utilization influence on ‘Increase Global Investment’ respectively as seen in Table 2. As a result of regression analysis, both ‘FTA Rules of Origin’ and ‘FTA Preferential Tariff’ made impact on ‘Increase Global Investment’ respectively. In detail, ‘FTA Rules of Origin’ was proved to influence to ‘Increase Global Investment’ negatively, whereas ‘FTA Preferential Tariff’ was proved to influence on ‘Increase Global Investment’ positively. However, ‘Trend towards Mega-FTA’ was verified not to influence to ‘Increase Global Investment.’

Table 7: Regression Analysis of Corporate External Factors in FTA Utilization and Increase Global Investment

Model	Unstandardized Coefficient		Standardized Coefficient	t	Significance Probability
	B	Standard Error	Beta		
FTA Rules of Origin	-.430	.092	-.360	-4.691	.000
FTA Preferential Tariff	.816	.090	.729	9.034	.000
Trend towards Mega-FTAs System	-.114	.101	-.085	-1.130	.261
F=28.953, P<.001					

**C. FTA Utilization Internal Variables and ‘Strengthen Global Business Competences’ (Research Question 3)**

Multiple regression analysis was conducted to see how ‘Management’s Commitment to FTA’, ‘FTA Information Acquisition Capability’, and ‘Globalization Experience’ as corporate internal factors in FTA utilization influence to ‘Strengthen Global Business Competences’ as seen in Table 3. As a result of regression analysis, ‘Global Experience’ was proved to influence on ‘Strengthen Global Business Competences’ positively. However, both ‘Management’s Commitment to FTA’ and ‘FTA Information Acquisition Capability’ were verified not to influence to ‘Strengthen Global Business Competences’.

Table 8: Regression Analysis of Corporate Internal Factors in FTA Utilization and Strengthen Global Business Competences

Model	Unstandardized Coefficient		Standardized Coefficient	t	Significance Probability
	B	Standard Error	Beta		
Management’s Commitment to FTA	.099	.100	.109	.982	.328
FTA Information Acquisition Capability	.129	.129	.138	1.000	.320
Globalization Experience	.551	.168	.421	3.284	.001
F=22.853, P<.001					

**D. FTA Utilization Internal Variables and ‘Increase Global Investment’ (Research Question 4)**

Multiple regression analysis was conducted to see how ‘Management’s Commitment to FTA’, ‘FTA Information Acquisition Capability’, and ‘Globalization Experience’ as corporate internal factors in FTA utilization influence on ‘Increase Global Investment’ respectively as seen in Table 4. As a result of regression analysis, ‘Globalization Experience’ makes the strongest impact to ‘Increase Global Investment’ positively, followed by ‘FTA Information Acquisition Capability’ and ‘Management’s Commitment to FTA’ in sequence.

Table 9: Regression Analysis of Corporate Internal Factors in FTA Utilization and Increase Global Investment

Model	Unstandardized Coefficient		Standardized Coefficient	t	Significance Probability
	B	Standard Error	Beta		
Management’s Commitment to FTA	.203	.099	.187	2.055	.042
FTA Information Acquisition Capability	.327	.131	.287	2.486	.014
Globalization Experience	.558	.173	.349	3.226	.002
F=46.727, P<.001					

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## The Effects of Aqua Rehabilitation Exercise on Body Shape and Visual Analogue Scale in Elderly Women

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### Abstract---

**Background/Objectives:** The physical effects of underwater exercise includes muscle relaxation, decrease of muscular spasm and pain, increase of joint moving range and muscular strength, and improvement of stability and balance of body. This study aimed to investigate the changes in body shape and visual analogue scale of elderly women after 12 weeks of aqua rehabilitation exercise.

**Methods/Statistical Analysis:** The research subjects were elderly in 70s living in Korea who do not exercise regularly, do not take dietary supplement, and wish to attend 12 weeks of aqua rehabilitation exercise program. The aqua rehabilitation exercise was performed for a total of 48 sessions 4 times a week for 12 weeks each of 60 minutes. Walking, stretching, shaking, jumping, jogging were performed in order focusing on the spine in which low pressure was started and intensity was increased to optimum pressure. Body shape changes (Body style S-8.0: Korea) was used for body shape in which they were measured as shoulder, pelvis, leg length, balance of right and left. VAS (Visual analogue scale) was used for level of pain in which they were measured as subjective pain score. PASW 18.0 statistical program was used on the pre-test and post-test data to identify the effect of 12 week treatment. Descriptive statistics was suggested for each measurement period and two way 2-way repeated ANOVA was applied to find the interaction of the treatment effect. The significance level was set to be .05.

**Findings:** First, Shoulder angle showed significant interaction effect between EG and CG with  $p < .05$ . Pelvis angle showed significant interaction effect between EG and CG with  $p < .05$ . leg length showed significant interaction effect between EG and CG with  $p < .05$ . Balance of right and left showed significant interaction effect between EG and CG with  $p < .05$ . Second, VAS showed significant interaction effect between EG and CG with  $p < .001$ .

**Improvements/Applications:** Aquatic exercises make people to work out with the resistance in water, and ultimately strengthen the muscular strength of muscles around the joints. Furthermore, the underwater exercise program will help the participants to effectively use the resistance underwater and actively bring on euphoria to decrease pain.

**Keywords---** Aqua Rehabilitation Exercise, Body Shape, Visual Analogue Scale, Shoulder Angle, Pelvis Angle, Leg Length, Balance of Right and Left.

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## I. INTRODUCTION

The rate of the aging population over 65 years old in Korea recorded 2.9% in 1960s, but it increased 4.5 times in 2015. The National Office of Statistics in Korea estimates that the number of elderly people in Korea will keep rising, rating 24.3% in 2030 and 40.1% in 2060. In 2015, South Korea was ranked in the top 51 of 133 countries in elderly population rate, and it is assumed that it will skyrocket to the top 2 in 2060. Rapid population aging and low birth rate are chosen as the main two factors that accelerate the status quo<sup>1</sup>.

As aging proceeds, total physical functions including muscle system, skeletal system, nerve system, and joint working range decline, and as the age increases, the moving range of coxa decreases<sup>2</sup>. Furthermore, the scientists discovered that the biggest physical change which happens to the elder and accounts for almost 94% was from problems with bones and muscles<sup>3</sup>. Likely, the weakening muscles and asymmetric use of muscles trigger joint inflammation, and brings about more serious muscular weakening<sup>4</sup>. Especially, muscular strength of human rapidly decline after the age 60, and the muscular weakening of lower body decreases the ability of the stabilizing muscle, and ultimately make everyday life hard to be maintained<sup>5</sup>. Furthermore, since the muscular strength and muscle quantity decrease as well, it disturbs the coordination of muscles and their balancing ability. It finally makes the body of the elder to be easily hurt<sup>6</sup>.

Regular exercise positively influences the life of the elder people, by lengthening their life and maintains their healthy life. Crucially, it decreases the danger of chronic diseases<sup>7, 8</sup>. In addition, regular work outs psychologically stables the elder people and is now considered as a pivotal factor which helps them to maintain both sound mind and body<sup>9, 10</sup>.

Physical activity of senior citizens should be decided after carefully considering their motor abilities and physical conditions, and most of all, their particular conditions. Exercises for senior citizens should be constructed to extend the joint moving range of the seniors and increase their muscular strength at the same time<sup>11</sup>. There are a myriad of physical activities which are recommended to the seniors, but underwater exercise is considered as the best way to boost both muscular strength and joint moving range without giving too much stress to the body<sup>12</sup>. It not only minimizes the danger of myotonia and relapses, which easily happens when people exercise on land, but also enables people to easily adjust the level of resistance and maintain their body<sup>13</sup>.

Resistance in water gets bigger when people move their hands and legs faster and more intense, while it gets smaller when people move slower. Moving slowly underwater helps people to freely adjust the resistance, and find exercises which fits well to each of them<sup>14</sup>. Aquatic Rehabilitation Exercise is one of the special form of physical therapy which helps people who had abnormal patterns in their physical systems (muscular, skeletal, nervous, circulatory systems) and emotional systems, due to certain diseases or accidents. By using the unique characteristics of water such as water temperature, water resistance, buoyancy, and water pressure, (WATSU, Bad Ragaz Ring, Halliwick) aquatic rehabilitation exercise assists people to recover their abnormal patterns back to normal patterns<sup>15</sup>. The physical effects of underwater exercise includes muscle relaxation, decrease of muscular spasm and pain, increase of joint moving range and muscular strength, and improvement of stability and balance of body<sup>16</sup>.

This study aimed to investigate the changes in body shape and visual analogue scale of elderly women after 12 weeks of aqua rehabilitation exercise.

## II. STUDY METHOD

### A. Subject of study

The research subjects were elderly in 70s living in Korea who do not exercise regularly, do not take dietary supplement, and wish to attend 12 weeks of aqua rehabilitation exercise program. The experimental group (EG) participates in the aqua rehabilitation exercise whereas control group (CG) does not participate in the treatment program of this study. 8 subjects were assigned to each group but 1 subject from CG quit from the program. Therefore, total of 15 subjects participated in this program <Table 1>.

Table1: Physical Characteristic of Subjects (M±SD)

Group	N	Age(yr)	Height (cm)	Weight(kg)	Fat (%)
EG	7	72.28±1.35	158.88±2.94	63.21±2.27	29.33±3.20
CG	8	71.84±1.49	159.11±3.17	64.05±2.34	29.51±3.41

**B. Treatment Program**

The aqua rehabilitation exercise was performed for a total of 48 sessions 4 times a week for 12 weeks each of 60 minutes.

Walking, stretching, shaking, jumping, jogging were performed in order focusing on the spine in which low pressure was started and intensity was increased to optimum pressure<Table 2>.

Table 2: Aqua Rehabilitation Exercise

Program	Intensity	Exercise
Aqua rehabilitation exercise	RPE<17/ Repetitions 10	Warm up/ cool down : Stretching Main Exercise: Forward walking, backward walking, backward flexion, upper body flexibility, lower body flexibility, elbow gathering, should roll, pelvic rotation, ankle twist, wrist twist, chest extension

**C. Measurement**

Body shape changes (Bodystyle S-8.0: Korea) was used for body shape in which they were measured as shoulder, pelvis, leg length, balance of right and left.

VAS(Visual analogue scale) was used for level of pain in which they were measured as subjective pain score.

**D. Data Analysis**

PASW 18.0 statistical program was used on the pre-test and post-test data to identify the effect of 12 week treatment.

Descriptive statistics was suggested for each measurement period and two way 2-way repeated ANOVA was applied to find the interaction of the treatment effect. The significance level was set to be .05.

**III. RESULTS**

**A. Change in Body Shape**

Shoulder angle showed significant interaction effect between EG and CG with p<.05. Pelvis angle showed significant interaction effect between EG and CG with p<.05. leg length showed significant interaction effect between EG and CG with p<.05. Balance of right and left showed significant interaction effect between EG and CG with p<.05<Table 3>.<Table 4>.<Table 5>.<Table 6>.<Table 7>.

Table 3: Body Shape Descriptive Statistics

factor	group	Pre-test	Post-test
Shoulder (°)	EG	4.28±.85	3.72±.36
	CG	4.31±.94	4.33±.94
Pelvis (°)	EG	4.05±1.37	3.81±1.23
	CG	4.26±1.33	4.27±1.57
Leg length (mm)	EG	24.33±9.22	22.26±9.65
	CG	24.87±9.38	24.52±10.13
Balance (%)	EG	4.49±1.27	3.69±1.72
	CG	4.60±1.09	4.41±1.13

Table 4: Shoulder Angle 2-way Repeated ANOVA

factor	SS	df	MS	F	p
Group	.779	1	.779	.610	.449
Error	16.601	13	1.277		
Period	.520	1	.520	6.638	.023
Group*Period	.623	1	.623	7.955	.014
Error	1.019	13	.078		

Table 5: Pelvis Angle 2-way Repeated ANOVA

factor	SS	df	MS	F	p
Group	.841	1	.841	.219	.647
Error	49.869	13	3.836		
Period	.100	1	.100	4.960	.044
Group*Period	.116	1	.116	5.739	.032
Error	.262	13	.020		

Table 6: Leg Length 2-way Repeated ANOVA

factor	SS	df	MS	F	p
Group	14.658	1	14.658	.080	.782
Error	2393.145	13	184.088		
Period	10.952	1	10.952	12.473	.004
Group*Period	5.572	1	5.572	6.346	.026
Error	11.415	13	.878		

Table 7: Balance 2-way Repeated ANOVA

factor	SS	df	MS	F	p
Group	1.315	1	1.315	.391	.543
Error	43.764	13	3.366		
Period	1.820	1	1.820	16.602	.001
Group*Period	.706	1	.706	6.445	.025
Error	1.425	13	.110		

**B. Change in Pain**

VAS showed significant interaction effect between EG and CG with  $p < .001$ . <Table 8>. <Table 9>.

Table 8: VAS Descriptive Statistics

factor	group	Pre-test	Post-test
VAS	EG	6.39±1.49	4.98±1.25
	CG	6.59±1.24	6.42±1.12

Table 9: Pain 2-way Repeated ANOVA

factor	SS	df	MS	F	p
Group	5.059	1	5.059	1.561	.234
Error	42.137	13	3.241		
Period	4.638	1	4.638	254.511	.001
Group*Period	2.888	1	2.888	158.461	.001
Error	.237	13	.018		

**IV. DISCUSSION**

This study aimed to investigate the changes in body shape and visual analogue scale of elderly women after 12 weeks of aqua rehabilitation exercise.

Underwater exercise is considered one of the most effective ways to recover the body to regain balance without causing any pressure and stress to the human body. Therefore, it can be broadly used from children to the elder people, and even can be developed as a rehabilitation method to maintain health<sup>17</sup>.

Somatotype is considered as a phenotype which is decided by the influence of environment and genes, and the elements which decides the change in body also can be changed according to the factors including aging process, exercise, and nutrition<sup>18</sup>. Therefore, correct body posture improves the physical efficiency and declines the danger of being damaged, whereas imbalance of posture increases stress of human body and decrease the physical ability. To achieve a correct body type, development of muscular strength and correct range of skeletal system are necessary.

There were 5 similar and significant cases according to several preceding researches which were related to the mentioned subject. First, Ahn<sup>19</sup> showed that there was a positive change in body type of university students after 4 weeks of Thai massage therapy and aerobic exercise. Second, Lee<sup>20</sup> had undergone a 12-week-complex-exercise program for obese female university students, and found out that the complex-exercise program was much more effective than simple aerobic exercises. Third, Kim and Han<sup>21</sup> underwent rehabilitation exercises for 12 weeks to an aged women group, and figured out that the rehabilitation exercise program brought significant effect to their body type. Fourth, Jeon et al.<sup>22</sup> found that the complex chiropractic exercise program helped the body type of female students who were suffering from scoliosis. Finally, Part<sup>23</sup> found the balancing ability of senior women who were suffering from degenerative arthritis had improved after 16-week-underwater rehabilitation exercise.

In this study, 12 weeks of underwater rehabilitation exercise will be undergone by female seniors, to develop their physical balance which includes the length of legs, height of pelvis, and horizontality of shoulders, since underwater rehabilitation exercises highly use the characteristics of water itself. Exercises which use buoyancy and resistance of water help the physical balance to increase, joint moving range to expand, and the coordination to improve<sup>24</sup>.

Pain is one of the most common and the most important health problems for the seniors, and is estimated that half of the seniors in the society undergo<sup>25</sup>. Chronic diseases and the aging process mainly give rise to the pain<sup>26</sup>. Therefore, various health-related services should be provided to overcome the chronic pains which makes the seniors suffer<sup>27</sup>.

Underwater exercise helps the body to be lighter in the water thanks to the buoyancy of water<sup>28</sup>, helps the seniors who have weak joints and muscular strength to regain their health and improve their quality of life<sup>29</sup>, improves the physical strength by using the water resistance and viscosity<sup>30</sup>, and relieves the pain which comes from hip and knee joint inflammation<sup>30</sup>.

There were 4 effective cases from several preceding researches which were related to the pain relieving effect of exercise. First, Park<sup>31</sup> found out that 12-week-aquatic rehabilitation exercise brought significant decrease in waist pain to female seniors who actually suffered from waist pain. Second, Park<sup>32</sup> underwent a 8-week-underwater-exercise program and brought a positive effect in degenerative joint inflammation. Third, Silva<sup>33</sup> reported that the patients who were suffering from knee joint inflammation did have a significant decrease in pain after aquatic exercises. Lastly, Lee<sup>34</sup> also underwent 4 weeks of aquatic exercise program for curing purpose for rheumatoid arthritis patients over age 50.

In this study as well, positive and significant change in pain is expected after 12 weeks of aquatic rehabilitation exercise program aimed at female seniors, since the aquatic exercises make people to work out with the resistance in water, and ultimately strengthen the muscular strength of muscles around the joints<sup>35</sup>. Furthermore, the underwater exercise program will help the participants to effectively use the resistance underwater and actively bring on euphoria to decrease pain.

## V. CONCLUSION AND SUGGESTION

This research was aimed to find out how the aquatic rehabilitation exercise changes the female seniors' body type and subjective pain scale. To find out the result, the participants were divided into two groups and underwent the exercise including warming ups and warming downs, 4 times a week, for total 12 weeks. After 12 weeks of program, results of the study were same as the following. First, the horizontality of shoulders and pelvis, length of legs, and the body balance had an interactive effect with the exercise program. Second, 12 weeks of program had a positive effect on the subjective pain scale of the participants. Therefore, it had showed that the 12 weeks of aquatic rehabilitation exercise did have a significant influence on female seniors, with both aspects of body type and pain scale.

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## On the Sense of Community Depending on College Students' Aptitude

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### Abstract---

**Background/Objectives:** Early detection is of paramount importance in the prevention of massive fire outbreaks, as are analyzing the nature of the fires.

**Methods/Statistical Analysis:** The survey was conducted to a group of 91 college students attending at D University in Seoul and N University in Chonan. The subjects were tested having social and enterprising types as the first and the second code. The statistical analysis was conducted with the help of SPSS 18.0 and an independent sample t-test, Correlation analysis was performed.

**Findings:** It was found that a significant statistical difference in the team spirit was found between the two types: individuals with social personality had greater sense of community than those with enterprising personality. That is, social individuals with compassionate, serving and sacrificing character showed more sense of community than enterprising individuals who can better lead people and organizations.

**Application/Improvements:** The proper understanding of an individual's aptitude is expected to be used in psychological aspects. It is also expected that sense of community should be recognized as an important capacity and that systematic education and training should be expanded.

**Keywords---** Holland Aptitude Test, Social Type, Enterprising Type, Sense of Community.

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## I. INTRODUCTION

Once entering a college, students choose a major field. They might be concerned about choosing a major field since their middle school days. O. Im (2008) noted that one of the most influential factors in choosing one's career is his or her major field at college.<sup>1</sup> It has been recognized that the most influential factor in choosing a major field is one's aptitude, which also greatly affects one's profession or career. According to Aiken(1982), aptitude refers to one's ability to perform a certain task or function.<sup>2</sup> Also, Kaplan & Saccuzz (1982) defined it as one's potential to learn a special function and showed that an individual's success at a certain profession depends on one's aptitude and competence.<sup>3,4</sup>

However, it might be assumed that aptitude can affect one's psychological and mental aspects as well as his or her decision on a career or profession. Holland (1985), in his account of vocational personality types, claimed that a set of factors such as parents, family environment, socio-cultural environment, and physical environment combine to help establish one's personality along with an individual's various experiences.<sup>5,6</sup>

The present research discusses two types of personalities: social and enterprising. Social individuals are much concerned with the relationship others and activities with others. The correlation between these personality types of the sense of community will be under discussion. With a high level of sense of community, an individual and a group would possess personal and collective psychological affiliation, conduct a plenty of activities and seek high-quality life. In reality, the sense of community involves amicable interaction as well as intimacy among the members.<sup>7</sup>

As mentioned above, thus, most of the researches on aptitude have been performed in relation to career, profession and interests or to personality types in the form of tests like MBTI, Anneagram of Personality. The current study intends to identify the effect of personality types - social and enterprising- on the sense of community. The findings are expected to be applied to identify psychological areas and to be used as a tool to understand individuals. It is also suggested that expanded education and training should be provided in order to help college students enhance the sense of community, which is a required capacity to grow as a desirable citizen of society.

## II. THEORETICAL BACKGROUND

### A. Concept of Sense Community

Living as a member of a community means living with sense of community, which might mean that an individual places more importance on public interest. In other words, it involves recognition of a common destiny of an individual and a group or community.<sup>8</sup>

McMillan & Chavis (1986) defined the term 'sense of community' as one's affection with a group, membership spirit and influence among the members.<sup>9</sup>

It should be noted that their definition of the concept of sense of community contains not only affection with a group but also their shared emotional connection with which the members may exert influence and their desires may be met[10].

Also, Kanter (1972) stated that each individual in a group can obtain comprehensive fellowship through mutual interaction in a holistic perspective, and that the identity and cohesiveness of a group can be strengthened with the sense of equality among members. Therefore, he emphasized that recognition of one's role in a community and friendly harmony within it would enhance the internal relationship and mutual efforts.<sup>10</sup>

As shown above, the definition of the sense of community might vary from scholars and times. Researches focusing on the sense of community have emphasized different elements: independence, affiliation and activeness in J.

Kim(1993); sense of belonging, social connection, collective conscience, and practice will in H. Kim(2000); accountability and affection in Y. Shin(2003) .<sup>11,12, 13</sup>

It should be remembered, however, that the sense of community does not naturally come with good human relationship. It is an individual's integrated ability that includes a variety of areas including emotion, cognition, mutual interaction and sense of belonging. Thus, it is one of the required abilities for any college students getting ready to go into the real world.

### B. Holland Aptitude Types

Colleges provide human and physical resources to help their students find employment. Their efforts focus on equipping students with a variety of abilities and enhancing their competence to respond to a truly competitive labor market, One's aptitude toward vocations could predict a possibility of the future. Thus, various tests to measure aptitude are utilized to help students.

An aptitude test is used to predict one's possibility to produce achievements in a new environment or the degree of necessary specific training.<sup>4,14</sup>

John L. Holland(1985) classified peoples' vocational personalities into 6 types, emphasizing the harmony between their personality and the environment: Realistic, Investigative, Artistic, Social, Enterprising and Conventional.

Each of the six types might mean a sum of one's techniques and overall responses to his or her career decision Figure 1 shows a hexagon that can explain the correlation among the six types. Neighboring types are considered having a high degree of correlation, while the types in the opposite side connected by a diagonal line show a low degree of correlation. Note that the social and enterprising types are next to each other.<sup>5,6</sup>

The present research aims to discuss the characteristics of social and enterprising types. Social individuals possess social personality and they are concerned with the relationship with others and humanistic issues. They enjoy participating in group activities and helping, training, healing, counseling or developing others. They prefer a working environment that might promote social activities. Individuals with enterprising personality are much interested in challenging in the economic sector or area. They often lead persuasive and influential talks and prefer managing an organization or leading an organizational goal. They tend to be self-assertive, consider new challenges valuable and cherish social authority. Understanding the characteristics of these two types of personalities would help better understand distinctive features of each individual. (Figure 1)

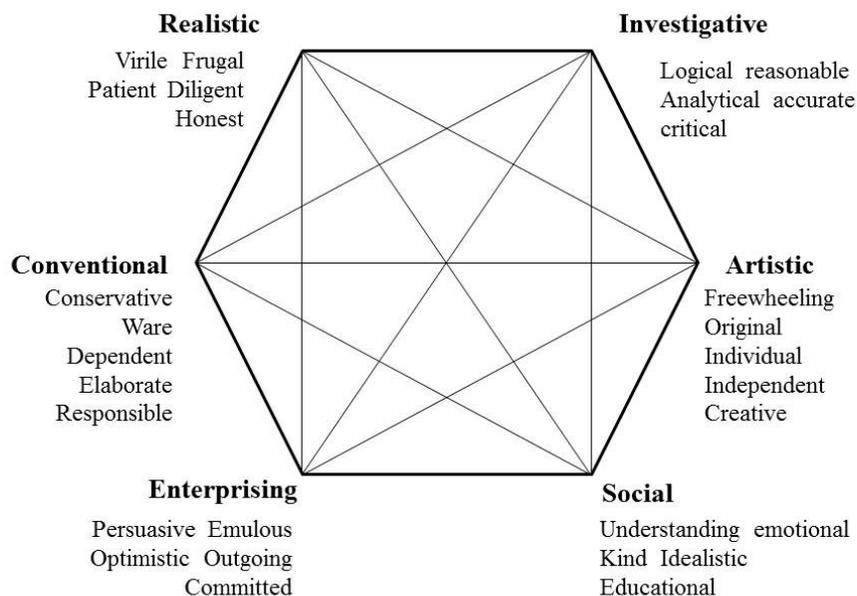


Figure 1: Holland hexagonal Model

Figure 1 shows a hexagon that can explain the correlation among the six types. Neighboring types are considered having a high degree of correlation, while the types in the opposite side connected by a diagonal line show a low degree of correlation. Note that the social and enterprising types are next to each other.

### III. RESEARCH CONTENTS AND METHODS

#### A. Research Subjects

Holland aptitude tests were administered to a group of college students attending D University located in Seoul, N University in Cheonan, and D University in Gyeongbuk Province. From the results of the test, the current research was conducted to a group of 91 students whose first and second codes were social and enterprising types. Table 1 below shows their demographical statistics.

Table 1: General Characteristics of the Subjects (number, %)

	Gender		Year in University			Major in University				
	Male	Female	2	3	4	Humanities	Natural Science	Social Science	Management	Total
Social type 51(56%)	22 (43.1)	29 (56.9)	4 (7.8)	28 (54.9)	19 (37.3)	12 (23.5)	6 (11.8)	23 (45.1)	10 (19.6)	51 (100)
Enterprising type 40(44%)	27 (67.5)	13 (32.5)	8 (20.0)	17 (42.5)	15 (37.5)	9 (22.5)	5 (12.5)	12 (30.0)	14 (35.0)	40 (100)

#### B. Research Tools

##### Holland type Aptitude Test

The present research adopted C. Ahn and H. Ahn's(2007) revised version of Holland aptitude test. This test is based on Holland 6 personality types: realistic, investigative, artistic, social, enterprising and conventional. The model called RAISEC can be presented as a hexagon as in.<sup>14</sup>Out of the 6 types, this study targeted social and enterprising types, who would show outstanding aptitude in relation to people. The survey consisted of a set of 268 items which can be classified into several categories: activities that one enjoys and wants to do(66 items), resemblance to a typical personality(60 items), search for the activities one is good at, vocational values, preference for professions, abilities and functions related with career. A total score measured in relation to the 6 RAISEC types would signify one's career code. That is, one of the 6 types in which one scored the most points is his or her career code. The group of subjects for this research is those students who marked the most or the second most points for the social and enterprising types. The reliability and validity of the research model was good enough.

##### Scale for Sense of Community

The current research adopted Y. Kim's(1998) scale for sense of community, which is a slightly revised version of K. Kim(1996) and J. Jung(1999)'s models.<sup>15,16,17</sup>The sub factors of this model, which was adapted and standardized to Korean society, include intimacy and sense of belonging, harmony and solidarity, voluntary participation and expression of opinions, identification and sharing, freedom and public awareness, authority and exclusiveness. The tool consisted of 24 items. The students' self-selection for all the items were measured on a five-point Likert scale. A higher score means a higher sense of community. It was found that the reliability and validity of the scale was good enough. The results of the survey are illustrated below.

Table 2: Reliability Coefficient of Sense of Community

Sub factors - sense of Community	Cronbach' a (advanced research)	Cronbach' a (the present Research)
intimacy and sense of belonging	.661	.793
harmony and solidarity	.706	.803
voluntary participation and expression of opinions	.658	.807
identification and sharing	.657	.782
freedom and public awareness	.638	.779
authority and exclusiveness	.505	.789

**Research Analysis Method**

The present research used these research tools and the collected data was processed by SPSS 18.0. A frequency analysis was conducted to identify the general characteristics of the subjects. Also, Exploratory factor analysis was conducted to verify for the validity of a sense of community and The present research was a correlation analysis of the sub-factors constituting a sense of community. Also, The independent sample t test was performed to evaluate difference of the social type and enterprising type for the sense of community.

**IV. THE FINDING**

The present research hypothesized that social and enterprising types would exhibit a statistically significant difference in their sense of community. The results of analysis are as follows.

**A. Technical Statistics of Social Type and Enterprising Type**

The mean and standard deviation for the two types are illustrated in Table 3

Table 3: The mean and Standard Deviation

Types	N	M	SD
Social	51	2.824	.544
Enterprising	40	2.546	.401

Table 3 shows the mean and standard of social type (M=2.824, SD=.544) was greater than the enterprising type(M=2.546, SD=.401); the difference was 0.278

**B. Technical Statistics of Sense of Community**

The mean and standard deviation for the sense of community is illustrated in Table 4

Table 4: The Mean and Standard Deviation

Sub-factors	N	M	SD
intimacy and sense of belonging	91	2.973	.7154
harmony and solidarity	91	2.767	.6110
voluntary participation and expression of opinions	91	2.563	.536
identification and sharing	91	2.514	.7153
freedom and public awareness	91	2.502	.689
authority and exclusiveness	91	2..893	.847

**C. Correlation Analysis for a Sense of Community**

The present research analyzed the correlation of the sub-factors that make up a sense of community. The results are as following

Table 5: Sub –Factor Correlation Analysis for a Sense of Community

Sub factors - sense of Commnity		[1]	[2]	[3]	[4]	[5]	[6]
intimacy and sense of belonging	[1]	1					
voluntary participation and expression of opinions	[2]	.396**	1				
harmony and solidarity	[3]	.570**	.374**	1			
identification and sharing	[4]	.366**	.431**	.281**	1		
freedom and public awareness	[5]	.430**	.417**	.335**	.695**	1	
authority and exclusiveness	[6]	.440**	.373**	.449**	.531**	.480**	1

**D. Factor Analysis of the Sense of community**

The present research analyzed the correlation of the sub-factors that make up a sense of community. The results are as following

Table 6: Factor Analysis of the Sense of Community

Item	1	2	3	4	5	6
1	.819	-.005	-.051	.159	.176	-.039
2	.740	.157	.338	.035	.042	.186
3	.726	.191	.329	-.055	.001	-.086
4	.708	.142	-.032	.275	.222	.119
5	.691	.208	.055	.492	.087	.021
6	-.113	.820	-.005	.205	.141	.128
7	.189	.755	.329	-.188	.162	.192
8	.340	.749	.087	-.021	.052	.124
9	.233	.695	.211	.265	-.011	.054
10	.143	.194	.930	.177	.014	.088
11	.146	.177	.924	.164	.035	.128
12	-.055	-.009	.328	.757	.170	.048
13	.392	.237	.001	.725	.049	-.014
14	.453	.022	.091	.689	.082	.114
15	.008	.260	-.201	.087	.809	.148
16	.228	-.067	.168	.133	.703	-.242
17	.227	.125	.154	.073	.677	.391
18	.157	.121	.196	-.096	.066	.852
19	-.114	.310	-.004	.359	.062	.702
Eigen Value	3.489	2.736	2.355	2.296	1.794	1.622
Common variance	18.362	14.389	12.395	12.087	9.444	8536
Cumulative variance	18.362	32..761	45.156	57.243	66.686	75.222
Crunbach's .882						
KMO=0.744, Bartlett' s test $X^2 = 1094.066(p<.001)$						

Table 6 shows that cumulative variance of sence of community is obtained at 75.222. And factor about the sence of community was consisting of 24 questions in advanced research that applied to this study. As a result of factorial analysis, 5 items were removed from all 24 items of advanced research. But It shows 6 sub-factors of advanced research was the same as advanced research equally.

**E. Test of the Difference in the Sense of Community between the Two Types**

An independent sample t-test shows a statistically significant difference in the sense of community between the social and enterprising types, as illustrated in Table 7.

Table 7: t-test for the Sense of Community of Social and Enterprising Types

Types		Levene's equal variance test		t-test for the equality of means		
		F	significance probability	t	degree of freedom	significance probability(two-tailed)
mean	equal variance assumed	3.751	.056	2.712	89	.008
	equal variance not assumed			2.812	88.703	.006

Table 7 shows that the significance probability in Levene's equal variance test was obtained at 0.056, which is greater than 0.05 at a confidence level of 95%. Thus, the hypothesis was adopted that the variance of the two types was equal. It can be concluded that there was a statistically significant difference between the two types, since t=2.712 and the two-tailed probability was obtained at .008: P<0.05. Although both types are

concerned with people and might be good at working with others, a social type person with deep understanding, high empathy ability, serving and sacrificing mind would have a greater sense of community than an enterprising individual who can act as a leader of an organization with his or ability to control and manage.

## V. CONCLUSION

The present research aimed to identify the relationship between Holland personality types, in particular, social and enterprising types, and the sense of community which involves various elements including emotion, cognition, relationship, fellowship and interaction. That is, we expected to show that an individual's aptitude would influence mental and psychological features like sense of community as well as one's career issues such as major fields and professions.

It was found that the two types - social and enterprising - exhibited a significant difference in the sense of community. Those with social personality, who possess greater ability to understand, cooperate and appreciate others have greater sense of community than enterprising type who have leadership. The role of a desirable citizen of society cannot be emphasized too much. And the sense of community is a required feature of such a desirable member of society.

In fact, modern society has been witnessing growing trend of individualism, which can be roughly and generally regarded as a synonym with egoism, though different in a strict sense. Individualism might hinder moral and emotional stability and often lead to destruction of human integrity, which might be attributable to lack of sense of community.<sup>15</sup>

The importance of sense of community has been recently recognized and researched. However, actual efforts have not much been exerted to enhance one's sense of community. Many programs and education have focused on human relationship and communication, but it is not easy to find programs to improve sense of community. The current research emphasizes the importance of sense of community as a crucial capacity for a member of society and the expanded applicability of aptitude types. The findings of this research are expected to provide implications for these areas and call for more interest and systematic education.

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# The Relationship among Pension Website Quality, Satisfaction, and Trust: The Moderating Effect of Gender

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## Abstract---

**Background/Objectives:** This study is aiming to identify website qualities which might affect user satisfaction and website reliability, and to identify the effect of those qualities on user satisfaction and website reliability.

**Methods/Statistical analysis:** A survey was carried out for the empirical research. The constructs in the study were measured using multi-item scales adapted from the existing literatures. All of the items in the questionnaire were measured with Likert scale questions that asked respondents to indicate their level of agreement or disagreement with a series of statements on a scale of one to five. CFA and Path analysis were used for the analysis.

**Findings:** First, this study analyzed the relationship among five factors of website image and user satisfaction and website reliability, the results were that all of the five hypotheses concerning the impact of information usefulness( $\beta=0.234$ ,  $t=2.687$ ), navigation convenience( $\beta=0.242$ ,  $t=2.927$ ), system processing( $\beta=0.258$ ,  $t=2.570$ ), customer response( $\beta=0.314$ ,  $t=3.225$ ), and website aesthetic( $\beta=0.201$ ,  $t=1.987$ ) on user satisfaction were supported. As expected these factors of website image are positively related to user satisfaction. Second, as we expected there turned out to exist positive relationship between website image and website reliability, the results of the estimated model showed that information usefulness ( $\beta=0.238$ ,  $t=2.478$ ) and customer response ( $\beta=0.225$ ,  $t=2.412$ ) significantly influenced on website reliability. Lastly, user satisfaction had a positive effect on website trust ( $\beta=0.219$ ,  $t=2.521$ ). Moreover, moderating effects of gender in the relationships between website image and user satisfaction and website trust are significant at the level of 0.05.

**Improvements/Applications:** The results show that each of the antecedent variables are found to have different degree of influences on user satisfaction and website reliability, and doesn't show evitable positive relationship between user satisfaction and website reliability.

**Keywords---** Pension Website, Website Quality, Website Image, Customer Satisfaction, Website Reliability.

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## **I. INTRODUCTION**

Today, purchasing product and service through the online is not a new concept in the local tourism and hospitality. The core business strategy is a means for forming the relationship between the customers on behalf of a real space in an online merchant.

According to Korean National Tourism Survey conducted by Korean Ministry of Culture, Sports and Tourism, for the question of accommodations most likely to visit, 30.1% of the respondents chose pension as an accommodation most likely to visit, followed by 17.8% of condominium, 10.3% of relatives' place, 9.1% of motel or inn, 9% of hotel 9% and 7.2% of camping site in order.

In this context, this study is aiming firstly to identify website qualities which might affect user satisfaction and website reliability, secondly to identify the effect of those quality on user satisfaction and website reliability, and then to figure out the linkage among website quality, user satisfaction, and website reliability.

## **II. THEORETICAL BACKGROUND AND HYPOTHESIS**

### **A. Website Image**

Traditionally, the common definitions of a physical retail store image are based on consumer perceptions of various store characteristics<sup>1,2</sup>. Evidently, store image is an important input in the consumer decision-making process<sup>3</sup>. The result suggested, "Image, especially the assortment dimension, was found to exhibit a strong influence on consumers' levels of liking for a shopping area". Also, store image encompasses various characteristics. These characteristics include physical environment of the store, service level, and merchandise quality<sup>4</sup>. In an e-commerce environment, the characteristics of a virtual store (e-commerce system) image are quite different from that of a physical retail store<sup>5</sup>.

Based on the researches, five dimension of website quality will be hired in this study; Information usefulness (IU), Navigation convenience (NC), System processing (SP), Customer response (CR), and Website aesthetic (WA).

### **B. User Satisfaction**

Customer satisfaction and service quality are two separate constructs. Oliver<sup>6</sup> claimed that quality is the antecedent of satisfaction. Zeithaml and Bitner<sup>7</sup> also stated that service quality assessment focuses primarily on dimensions of service, and perceived quality is not only a component of customer satisfaction but is also influenced by product quality, price, customer factors, and situational factors. User satisfaction in the context of website usage can be defined as "the contentment of the customer with respect to his or her prior purchasing experience with a given electronic commerce firm". They employed Oliver's<sup>6</sup> multi-item scale to measure customer satisfaction in an e-retailing context. Moreover, the marketing literature indicates that customer satisfaction eventually leads to users' loyalty<sup>8</sup>.

H1a: Information usefulness will have a positive effect on User Satisfaction.

H1b: Navigation convenience will have a positive effect on User Satisfaction.

H1c: System processing will have a positive effect on User Satisfaction.

H1d: Customer response will have a positive effect on User Satisfaction.

H1e: Website aesthetic will have a positive effect on User Satisfaction.

### **C. Website Reliability**

According to Reichheld and Scheffer<sup>9</sup>, the most important factor consumers use to assess e-commerce websites is the level of trustworthiness conveyed. This is because with the absence of tangible attributes such as physical store locations, the ability to touch, feel and inspect the products and the risk of websites not delivering the product after receiving payment, trust is a highly important factor in providing ease of mind<sup>10</sup>. Thus, trustworthiness is a critical risk-reduction factor for online shoppers.

In the context of website experience, this study postulates consumer perceptions of trustworthiness to be an important factor which must be addressed, and in the case of e-commerce websites, the focus should be on perceptions of privacy and security. In today's world of sophisticated web analytics, privacy whilst browsing online is a major concern for web-users<sup>11</sup>. Consumers are concerned that their details are actually being collected without their knowledge, and that information would be used for a range of purposes, from something as innocuous as pesky spam e-mails pushing various products and services, to major problems like

identity theft and credit card fraud<sup>12</sup>. Thus, it has been found that measures such as privacy statements have found to put consumers "at ease" and helped to foster feelings of trust and credibility with e-commerce websites<sup>13</sup>.

- H2a: Information usefulness will have a positive effect on Website Reliability.
- H2b: Navigation convenience will have a positive effect on Website Reliability.
- H2c: System processing will have a positive effect on Website Reliability.
- H2d: Customer response will have a positive effect on Website Reliability.
- H2e: Website aesthetic will have a positive effect on Website Reliability.
- H3: User Satisfaction will have a positive effect on Website Reliability.

**D. Gender**

Gender refers to psychological features related to biological nature. Men tend to be independent, rational, individual goal-oriented, and linked with masculinity whereas women tend to be sensitive, intuitive, passionate, communal goal-oriented, and linked with femininity<sup>14</sup>. These attributes can influence behaviors and attitudes of each gender differently with regard to consumption activities.

- H4: The relationship between Website Quality and User Satisfaction will be moderated by gender.
- H5: The relationship between Website Quality and Website Reliability will be moderated by gender.
- H6: The relationship between User Satisfaction and Website Reliability will be moderated by gender.

**III. RESEARCH METHODOLOGY**

A survey was carried out for the empirical research from September 15<sup>th</sup> of 2015 to December 28<sup>th</sup> of the same year to figure out the degree of effect of image factors of pension on consumers' satisfaction and website trust. 262 questionnaires were used eventually out of a total number of 297 due to irrelevant responses and missing data. 69.8 percent of the respondents were male and 30.2% were female. And 47.7 percent of the respondents were 30s, followed by 20s, 40s, and 50s in order.

The constructs in the study were measured using multi-item scales adapted from the existing literatures. The survey instrument was developed by adopting existing validated questions wherever possible. All of the questions were Likert scale questions that asked respondents to indicate their level of agreement or disagreement with a series of statements on a scale of 1(strongly disagree) to 5(strongly agree). The survey questions are presented in the Table 1.

Table 1: Measures

Construct	Operational definition	Item
Information usefulness (IU)	Usefulness of information that the website provides	1. Pension website image helps me with understanding information on the pension
		2. Pension website image helps me with evaluating the pension.
		3. Pension website image helps me with searching information on the pension.
Navigation convenience (NC)	Convenience in searching information in the website	1. It is easy to explore on the website.
		2. It is convenience to search the services and products that the pension offers.
		3. The services and products are well organized on the website.
System processing (SP)	Reactivity of processing in the website	1. The system of the website responses immediately.
		2. Connecting speed of the website is fast.
		3. Page loading of the website is fast.
Customer response (CR)	Response toward customers' requests in the website	1. The website system provides immediate services.
		2. The website responds immediately all the time.
		3. The website responds immediately to inquiries.
Website aesthetic (WA)	Visible aesthetic features of the website	1. Design of the website is authentic.
		2. Design of the website is aesthetic.
		3. Design of the website is impressive.
User satisfaction (US)	Degree of customers' satisfaction with the website	1. Overall, I am satisfied with the website.
		2. The website makes me feel better after visiting the website.
		3. It is pleasure to visit the website.
Website reliability (WR)	Trustworthy of the website	1. The information provided from the website is reliable.
		2. The website provides accurate information.
		3. The website provides with trustworthy information.

#### IV. RESULTS

The confirmatory factor shows good fit between the data and the construct of scale ( $\chi^2=206.4$ , d.f.=61,  $p=0.001$ , GFI=0.910, AGFI= 0.873, RMR=0.025, TLI=0.973, CFI= 0.978, RMSEA=0.044). Table 2 shows the analysis of measures of the questionnaire, including standard factor loadings, composite reliability, and average variance extracted (AVE). The composite reliability from all the constructs ranged from 0.702 to 0.885, exceeding the recommended 0.6 criterion in this study. Also, The AVE of each latent factor ranged from 0.626 to 0.873, more than the recommended value of 0.5, suggesting that the constructs are distinct

Table 2: Convergent Validity and Reliability

Construct	Item	Estimate	Std. estimate	S.E.	C.R.	Composite reliability	AVE
IU	IU1	0.943	0.782	0.095	9.932**	0.743	0.691
IU	IU2 <sup>a</sup>	1.000	0.752				
IU	IU4	0.974	0.783	0.098	9.940**		
NC	NC1	0.989	0.827	0.078	12.651**	0.786	0.749
NC	NC2	0.949	0.785	0.079	11.987**		
NC	NC3 <sup>a</sup>	1.000	0.831				
SP	SP1	0.960	0.873	0.057	16.787**	0.834	0.814
SP	SP2 <sup>a</sup>	1.000	0.896				
SP	SP3	0.921	0.826	0.060	15.302**		
CR	CR1	0.954	0.877	0.058	16.495**	0.822	0.801
CR	CR2	0.992	0.878	0.060	16.529**		
CR	CR3 <sup>a</sup>	1.000	0.873				
WA	WA1	0.985	0.691	0.154	6.384**	0.702	0.626
WA	WA3 <sup>a</sup>	1.000	0.730				
US	US1	0.983	0.877	0.053	18.722**	0.885	0.873
US	US2 <sup>a</sup>	1.000	0.923				
US	US3	0.921	0.884	0.048	19.018**		
WR	WR1	0.925	0.865	0.056	16.572**	0.810	0.785
WR	WR2 <sup>a</sup>	1.000	0.912				
WR	WR3	0.842	0.799	0.058	14.583**		

a: reference variable; \*\*:  $p < 0.01$

According to Fornell and Larcker<sup>15</sup>, discriminant validity is achieved if the AVE of the construct of interest is greater than the squared correlations between that construct and all other constructs in the model.

Table 3: Discriminant Validity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Information usefulness	0.831						
(2) Navigation convenience	0.554	0.866					
(3) System processing	0.293	0.549	0.902				
(4) Customer response	0.299	0.492	0.506	0.895			
(5) Website aesthetic	0.453	0.491	0.482	0.499	0.791		
(6) User satisfaction	0.414	0.380	0.565	0.595	0.517	0.934	
(7) Website trust	0.429	0.553	0.544	0.589	0.480	0.556	0.886

Notes: Correlations are below diagonal and the square root of the AVE values are presented on the diagonal

The structural model created indicated acceptable goodness-of-fit-measures ( $\chi^2= 206.4$ , d.f.=149,  $p=0.001$ , GFI=0.910, AGFI=0.873, RMR=0.025, TLI=0.973, CFI=0.978, RMSEA=0.044). Consequently, these results indicated that the structural model shown adequately fitted the data. Table 4 shows the results of fifteen hypotheses in this study.

A summary of results is as follows. First, this study analyzed the relationship between five factors of website image and user satisfaction, the results were that all of the five hypotheses concerning the impact of

information usefulness ( $\beta=0.234$ ,  $t=2.687$ ), navigation convenience ( $\beta=0.242$ ,  $t=2.927$ ), system processing ( $\beta=0.258$ ,  $t=2.570$ ), customer response ( $\beta=0.314$ ,  $t=3.225$ ), and website aesthetic ( $\beta=0.201$ ,  $t=1.987$ ) on user satisfaction were supported. As expected these factors of website image are positively related to user satisfaction. Thus, H1a, H1b, H1c, H1d, and H1e are supported. Second, as we expected the positive relationship between website image and website trust, the results of the estimated model showed that information usefulness ( $\beta=0.238$ ,  $t=2.478$ ) and customer response ( $\beta=0.225$ ,  $t=2.412$ ) significantly influenced on website trust. Therefore, H2a and H2d were supported. However, navigation convenience, system processing, and website aesthetic had no significant effect on website reliability. Thus, H2b, H2c, and H2e were rejected. Lastly, user satisfaction had a positive effect on website reliability ( $\beta=0.219$ ,  $t=2.521$ ). Accordingly, H3 was supported.

Table 4: The results of hypotheses testing

Hypothesis	Independent variable	Dependent variable	Std. estimate	S.E.	C.R.	Result
H1a	IU	US	0.234	0.098	2.687**	Supported
H1b	NC	US	0.242	0.097	2.927**	Supported
H1c	SP	US	0.258	0.095	2.570**	Supported
H1d	CR	US	0.314	0.085	3.225**	Supported
H1e	WA	US	0.201	0.128	1.987*	Supported
H2a	IU	WT	0.238	0.118	2.478*	Supported
H2b	NC	WT	0.067	0.111	0.664	Rejected
H2c	SP	WT	0.059	0.147	0.592	Rejected
H2d	CR	WT	0.225	0.101	2.412*	Supported
H2e	WA	WT	0.089	0.115	1.011	Rejected
H3	US	WT	0.219	0.101	2.521*	Supported
*p<0.05; **p<0.01						

Moreover, in this study, since we assume that gender will moderate the influence inbetween the variables. Thus, to figure out moderating effect of gender group analysis has been conducted using AMOS. The moderating effects of gender in the relationships between website image and user satisfaction and website trust are significant at the level of 0.05, so H4a, H4c, H4e, and H5d are supported. However, the rest are all rejected. The results of moderating effects are shown in Table 5.

Table 5: Moderating Effect of Gender

Hypothesis: Moderating path	Male(n=183)		Female(n=79)		Constrained model		Result
	Std. estimate	C.R.	Std. estimate	C.R.	$\chi^2$	$\Delta\chi^2$	
H4a: IU → US	0.258	2.354*	0.223	1.788	751.94	6.06*	Supported
H4b: NC → US	0.241	2.109*	0.264	2.213*	746.35	0.47	Rejected
H4c: SP → US	0.253	2.365*	0.077	0.478	753.52	7.64**	Supported
H4d: CR → US	0.308	2.957**	0.236	2.613**	749.10	3.22	Rejected
H4e: WA → US	0.127	1.193	0.249	2.726**	751.20	5.32*	Supported
H5a: IU → WT	0.156	1.671	0.076	0.487	746.02	0.14	Rejected
H5b: NC → WT	0.172	1.745	0.146	0.173	749.70	3.82	Rejected
H5c: SP → WT	0.255	3.004**	0.238	2.471*	746.10	0.22	Rejected
H5d: CR → WT	0.312	3.022**	0.372	2.725*	750.13	4.25*	Supported
H5e: WA → WT	0.122	1.181	0.110	0.486	746.30	0.42	Rejected
H6: US → WT	0.126	2.473*	0.178	2.893*	745.98	0.10	Rejected
Notes: $\chi^2(298)=745.88$ , $P=0.000$ , $GFI=0.896$ , $AGFI=0.872$ , $RMR=0.049$ , $CFI=0.941$ , $RMSEA=0.076$ *p<0.05, **p<0.01							

## V. CONCLUSION

The purpose of this study is firstly to identify website qualities which might affect user satisfaction and website reliability, secondly to identify the effect of those quality on user satisfaction and website reliability,

and then to figure out the linkage among website quality, user satisfaction, and website reliability. To achieve goals of this paper, a survey has been carried out for the empirical research.

The results of this study suggest implications below. First, information usefulness is shown to have a positive linkage with both of user satisfaction and website reliability. This is meaning to say that the quantity and quality of the information provided by the website creates user satisfaction and build reliability. Second, navigation convenience, system processing and website aesthetic show positive influence on user satisfaction, but not on website reliability. On the other hand, user satisfaction is found to have a positive effect on website reliability. This tells that navigation convenience could establish user satisfaction but does not directly build reliability. In other words, the convenience, process, or aesthetic website will firstly and directly affect user satisfaction and user satisfaction accordingly would affect website reliability. Third, customer response also shows positive correlation on both of user satisfaction and website reliability. This also tells that response to customers would play a critical role that build user satisfaction and website reliability as well.

Lastly, the result from the analysis on mediating effect of gender on the relationship among the website quality, user satisfaction and website reliability shows that different influential degree of effects of information usefulness, system processing, and website aesthetic on user satisfaction. Moreover, in the relationship between customer response and user satisfaction, female shows stronger influence over male.

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# The Relationship among Perceived Usefulness, User Satisfaction, Continuance Intention, and Positive WOM in Internet Banking

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## Abstract---

**Background/Objectives:** this study is aiming to figure out the influence of satisfaction and website usability in developing reuse intention and positive WOM in the Internet banking business.

**Methods/Statistical Analysis:** A survey was carried out for the empirical research. 290 questionnaires were hired eventually after eliminating 37 questionnaires with irrelevant responses out of total number of 327 collected questionnaires. The analysis started with conducting a confirmatory factor analysis. CFA was used AMOS 18.0 with maximum likelihood estimation to assess the measurement model. Further, path analysis was conducted to test hypotheses.

**Findings:** First, this study analyzed the relationship between perceived usefulness and user satisfaction, the result was that the hypothesis concerning the impact of perceived usefulness ( $\beta=0.712$ ,  $t=13.326$ ) on user satisfaction were supported. Second, perceived usefulness ( $\beta=0.507$ ,  $t=7.567$ ) and user satisfaction ( $\beta=0.384$ ,  $t=6.061$ ), as expected, are positively related to continuance intention. Third, the results of the estimated model showed that perceived usefulness ( $\beta=0.210$ ,  $t=2.215$ ), user satisfaction ( $\beta=0.372$ ,  $t=4.535$ ), continuance intention ( $\beta=5.542$ ,  $t=5.431$ ) turned out to have significantly influenced on positive WOM. To improve the level of user satisfaction on internet banking services, marketers should emphasize that internet banking service is designed to improve the productivity of individuals' work performance as a way of efficient and economical financial process. And also the result shows that informing users of usefulness of internet banking will lead the user satisfaction to improve continuance intention on internet banking usage. In addition, to build a sustainable and long-term relationship with internet banking user, and to establish positive WOM environment, the most critical factor is user satisfaction on internet banking experience.

**Improvements/Applications:** Structural modeling largely supports the hypothesized framework and the major findings of this study are summarized as follows. First, website usability is directly related to user satisfaction. Second, the analysis shows that user satisfaction affects positively on reuse intention and positive WOM. Third, perceived risk has moderating effect between website usability and user satisfaction. Finally, Extraversion has moderating effect between reuse intention and positive WOM.

**Keywords---** Internet Banking, Perceived Usability, User Satisfaction, Reuse Intention, WOM.

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## I. INTRODUCTION

Rapid development in information technology has been contributed to enhancing service reliability and to reducing costs in service delivery<sup>1</sup>.

The motivation in reducing costs has been regarded as an issue of a reason to combine internet-based service with banking services<sup>2</sup>.

Moreover, development of internet banking has progressively changed means of transaction in banking field<sup>3</sup>.

Internet banking service inevitably needs to enhance its usefulness since internet service cannot attract potential customers if there's no difference from traditional means of bank transaction. This is meaning to speak usefulness of internet banking can be a key factor that improve customers' interaction and experience of banking services<sup>4</sup>.

Moreover, satisfied customers will have positive intention of continuance in use and WOM<sup>5</sup>. Thus, bank's providing usefulness of internet banking services and customers' satisfaction in internet banking services play a role of improving competitiveness of bank services.

Most of previous studies on the field of e-commerce have focused on internet shopping mall, and studies on internet banking service have hardly been conducted despite of the importance of the service. Thus, this study is aiming to figure out the influence of satisfaction and website usability in developing reuse intention and positive WOM in the Internet banking business.

## II. THEORETICAL BACKGROUND AND HYPOTHESIS

### A. *Perceived Usefulness and User Satisfaction*

Davis<sup>6</sup>suggested that perceived usefulness is degree of assisting improvement in user's quality of decision making, performance, processing system, which is not objective index, but a subjective belief. In addition, another definition of perceived usefulness, defined by Nielsen<sup>7</sup>, is that usefulness is related to a concept of how well users can deal with a system, how easy users can memorize function, how efficient the website operates, and how well users can avoid errors. Accordingly, users with high perceived usefulness tend to use various function of the system, which is leading high productivity<sup>8</sup>.

Moreover, design and usefulness of website are the important factors that determine the quality of the website and usefulness of website roles a critical factor when services are delivered via online<sup>9</sup>. One clear fact is that perceived usefulness improve intimacy between users and the website, which will eventually influence users' future behavior<sup>5</sup>. Based on the studies, the following hypothesis is extracted.

**H1 : Perceived usefulness of Internet banking will positively affect user satisfaction.**

### B. *Continuance Intention*

On the other hand, Oliver<sup>10</sup> suggested that user satisfaction is positively linked with reuse intention. Continuance intention, in this context of internet banking services, can be defined as psychological status that have the users feel worthwhile to use the system persistently after experience internet banking services and even the services provided from the website.

Thus, continuance intention can be criteria to judge success or failure in service providing field. Based on the studies, the following hypotheses are hired

**H2 : Perceived usefulness of Internet banking will positively affect continuance intention.**

**H3 : User satisfaction on Internet banking will positively affect continuance intention.**

### C. *Positive WOM*

Moreover, WOM can be a powerful motivation to other consumers' behavior. WOM, in addition, is based on direct experience of the product or service, so the users often rely on the information of WOM, which might refer to degree of the satisfaction of the prior users. Therefore, based on the studies, the hypotheses below are hired for this study.

**H4 : Perceived usefulness of Internet banking will positively affect positive WOM.**

**H5 : User satisfaction on Internet banking will positively affect positive WOM.**

**H6 : Continuance intention on Internet banking usage will positively affect positive WOM.**

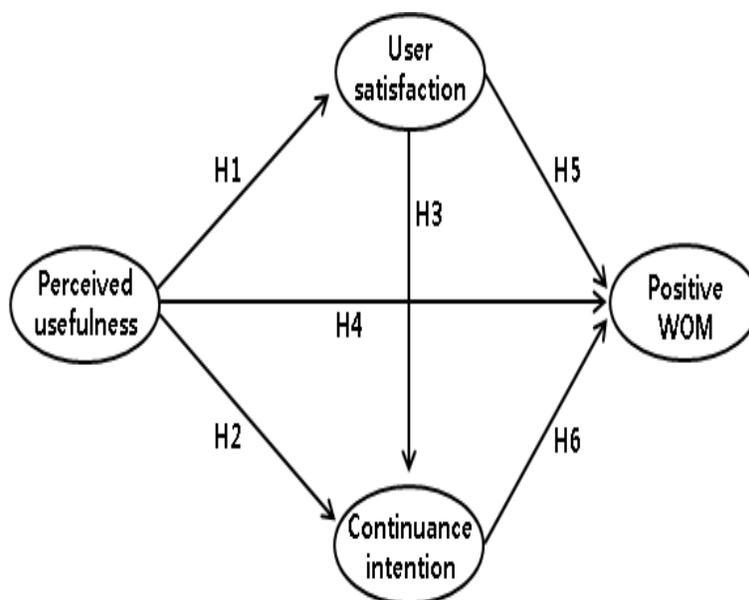


Figure 1: Research Model

### III. RESEARCH METHODOLOGY

#### A. Data Collection

A survey was carried out for the empirical research. 290 questionnaires were hired eventually after eliminating 37 questionnaires with irrelevant responses out of total number of 327 collected questionnaires. 58.2 percent of the respondents were male (n=169) and 40.2% were female (n=121). And 43.1 percent of the respondents were 20s, with 14.8 percent of 30s, 26.2 percent of 40s and 15.9 percent of 50s or over.

#### B. Measures

The constructs in this study, including perceived usefulness, user satisfaction, continuance intention, and positive WOM, were measured by multi-item scales mostly adapted from the existing literature. All involved constructs were measured using five-point Likert scales (1 = strongly disagree, 5 = strongly agree). The survey questions are presented in the Table 1.

Table 1: Measures

Construct	Item	Researchers
Perceived usefulness	① It provides quick and accurate banking services	Kucukusta et al., 2015 <sup>11</sup>
	② It helps with increasing productivity.	
	③ It is an economical means of transaction	
User satisfaction	① Satisfied with bank transaction.	Amin et al., 2014 <sup>12</sup>
	② Satisfied with process of banking services.	
	③ Satisfied with the way of using it.	
Continuance intention	① Will use internet banking service as possible.	Mohamed et al., 2014 <sup>13</sup>
	② Will use internet banking service even for transaction of big amount.	
	③ Will use it for the branch bank nearby.	
Positive WOM	① Will tell others how to use that.	Sweeney et al., 2014 <sup>14</sup>
	② Will inform benefits to others	
	③ will inform various services of this to others.	

#### IV. RESULTS

##### A. Reliability and Validity of Measure

The analysis started with conducting a confirmatory factor analysis. CFA was used AMOS 18.0 with maximum likelihood estimation to assess the measurement model. Overall fit indices demonstrated a good fit with the data( $\chi^2=142.98$ , d.f.=48, p=0.000, GFI=0.928, AGFI=0.883, RMR=0.028, TLI= 0.960, CFI=0.971, RMSEA=0.053).

In the table 2, significant t-values of each item's estimated path coefficient on its posited latent construct and high squared multiple correlations for the individual items indicated convergent validity(Lusch and Brown, 1996). Also, the results of the composite reliability test showed that the values of all four constructs used in this study exceeded the minimum requirement(all above 0.70), indicating that multiple measurement items were highly reliable for measuring each construct(Hair et al., 2010).

Table 2: Convergent Validity and Reliability

Construct	Item	Unstd. estimate	Std. estimate	S.E.	C.R.	Composite reliability	AVE
Perceived usefulness (PU)	PU1	0.863	0.871	0.044	19.602**	0.768	0.737
	PU2	1.000	0.894	-	-		
	PU3	0.724	0.767	0.045	15.978**		
User satisfaction (US)	US1	0.905	0.904	0.033	27.584**	0.904	0.897
	US2	1.000	0.949	-	-		
	US3	0.915	0.923	0.031	29.546**		
Continuance intention (CI)	CI1	0.841	0.882	0.039	21.486**	0.801	0.782
	CI2	1.000	0.891	-	-		
	CI3	0.904	0.901	0.040	22.383**		
Positive WOM (PW)	PW1	0.942	0.901	0.041	23.053**	0.835	0.817
	PW2	1.000	0.925	-	-		
	PW3	0.931	0.812	0.049	18.885**		
a: reference variable, **p<0.01							

Further, in order to test discriminant validity, Hair et al.<sup>15</sup> suggested that the square root of AVE (average variance extracted) should be greater than the correlation between every construct. Table 3 shows that all AVEs exceeded the minimum criteria(above 0.5) suggested by Bagozzi and Yi<sup>16</sup>. Also, The AVE of each latent factor ranged from 0.626 to 0.873, more than the recommended value of 0.5, suggesting that the constructs are distinct. According to Fornell and Larcker<sup>17</sup>, discriminant validity is achieved if the AVE of the construct of interest is greater than the squared correlations between that construct and all other constructs in the model.

Table 3: Discriminant Validity

	(1)	(2)	(3)	(4)
(1) Perceived usefulness	0.858			
(2) User satisfaction	0.712	0.947		
(3) Continuance intention	0.780	0.744	0.904	
(4) Positive WOM	0.478	0.626	0.655	0.884
<i>Notes:</i> Correlations are below diagonal, squared correlations are above the diagonal, and the square root of the AVE values are presented on the diagonal; MC is the m-commerce.				

##### B. Structural Analysis and Hypothesis Testing

The structural model created indicated acceptable goodness-of-fit-measures( $\chi^2=142.98$ , d.f.=48, p=0.000, GFI=0.928, AGFI=0.883, RMR=0.028, TLI=0.960, CFI=0.971, RMSEA=0.053). Consequently, these results indicated that the structural model shown adequately fitted the data. Table 4 shows the results of fifteen hypotheses in this study.

A summary of results is as follows. First, this study analyzed the relationship between perceived usefulness and user satisfaction, the result was that the hypothesis concerning the impact of perceived

usefulness( $\beta=0.712$ ,  $t=13.326$ ) on user satisfaction were supported. Accordingly, H1 was supported. This result means that the result of hypothesis test on H1 complies with the results from the previous studies. Thus, to improve the level of user satisfaction on internet banking services, marketers should emphasize that internet banking service is designed to improve the productivity of individuals' work performance as a way of efficient and economical financial process.

Second, perceived usefulness( $\beta=0.507$ ,  $t=7.567$ ) and user satisfaction( $\beta=0.384$ ,  $t=6.061$ ), as expected, are positively related to continuance intention. Thus, H2 and H3 were supported. This result shows that informing users of usefulness of internet banking will lead the user satisfaction to improve continuance intention on internet banking usage.

Third, as the relationship among perceived usefulness, user satisfaction, continuance intention, and positive WOM is supposedly expected to be positively linked one another, the results of the estimated model showed that perceived usefulness( $\beta=0.210$ ,  $t=2.215$ ), user satisfaction( $\beta=0.372$ ,  $t=4.535$ ), continuance intention( $\beta=5.542$ ,  $t=5.431$ ) turned out to have significantly influenced on positive WOM. Therefore, H4, H5, and H6 were supported. These results comply with existing studies. To build a sustainable and long-term relationship with internet banking user, and to establish positive WOM environment, the most critical factor is user satisfaction on internet banking experience. Moreover, to build more favorable WOM environment, improving perceived usefulness is inevitably needed on the other end, which is leading user satisfaction accordingly. And this will also affect continuance intention and positive WOM.

Table 4: The Results of Hypotheses Testing

Hyp.	Path		Std. estimate	S.E.	C.R.	Result
H1	Perceived usefulness	User satisfaction	0.712	0.046	13.329**	Supported
H2	Perceived usefulness	Continuance intention	0.507	0.071	7.567**	Supported
H3	User satisfaction	Continuance intention	0.384	0.078	6.061**	Supported
H4	Perceived usefulness	Positive WOM	0.210	0.080	2.215*	Supported
H5	User satisfaction	Positive WOM	0.372	0.080	4.535**	Supported
H6	Continuance intention	Positive WOM	0.542	0.079	5.431**	Supported
* $p<0.05$ , ** $p<0.01$						

## V. CONCLUSION

The main purpose of this study is firstly to figure out influential roles of perceived usefulness of the internet banking users, in the industry of financial services, and then to confirm the relationship among user satisfaction, continuance intention, and positive WOM. To achieve the goal of the study, a survey was carried out targeting internet banking users, and the results are as followings.

First, perceived usefulness of internet banking service users turned out to have a positive effect on user satisfaction, continuance intention and positive WOM. This tells that the users enrich profitability when they handle financial works, and also this would be an economical way of using financial services instead of visiting a branch of a bank. Secondly, this study hired continuance intention and positive WOM for consequence variable of user satisfaction.

The result of the study shows that user satisfaction is linked positively with continuance intention and positive WOM. This result complies with the results of studies which are conducted focusing on various industries to figure out the relationship among satisfaction, reuse intention, positive WOM. In terms of that the users are expected to decide whether they will reuse or not after experiencing internet banking services and even other services provided from the website as well, user satisfaction would be critical performance indicator. Thus, managing user satisfaction is that important element to banking service providers. Thirdly, continuance intention is shown to have a positive influence on positive WOM. This result tells that satisfied users play a critical role to lure potential users in the future with positive telling. Users with satisfaction on his/her experiences tend to deliver positive experiences to potential users by words. As a result, improving user satisfaction will not only affect improving continuance intention but also trigger positive WOM.

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## Retail Strategy for the Korean Drugstore of Market Latent Growth

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### Abstract---

**Background/Objectives:** Distribution industry has been getting complex and accordingly been leading diversification of retailer types. In this context, Korean drugstore has developed as a type of store specializing in cosmetics and medical supplies and it spreads over the country.

**Methods/Statistical Analysis:** The purpose of this study is to apply the ETAM(Expanded Technology Acceptance Model) is conducted to find out the empirical research of consumer behavior in Korea drugstore clearly. In order to investigate the hypotheses, a questionnaire was performed. A total number of 280 questionnaires were answered by shoppers of Korean drugstore. This study used final sample of 267 respondents eliminating 13 with the missing data. This study measures the constructs using multi-item scales adapted from the previous literature. A 7-point Likert scale was used.

**Findings:** the consumption value factors, presented as the core of ETAM, economic, convenience and hedonic value have positive impacts on the consequence(perceived ease of use, perceived usefulness). But social value does not affect the perceived ease of use, perceived usefulness. Also it does not have a direct effect on the perceived ease of the purchase intention, when the perceived usefulness as a mediator was positive(+) effect on purchase intention.

**Improvements/Applications:** These findings are expected to provide useful information to stakeholders is to establish an effective communication retail strategy on the Korean drugstore.

**Keywords---** Korean Drugstore, Ease of Use, Perceived Usefulness, Purchase Intention, Individual Value, Social Value.

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## I. INTRODUCTION

As the legal environment related to Korean drugs such as supermarket sales permit, the Pharmaceutical Affairs Law revision changes are also embraced a new phase pharmaceutical retail market<sup>1</sup>. Recently, distribution industry has been getting complex and this has accordingly been leading diversification of retailer types. In this context, Korean drugstore has developed as a type of store specializing in cosmetics and medical supplies and it spreads over the country. TAM (Technology Acceptance Model<sup>2</sup>) is a rational action theory of social psychology: on the basis of TRA (Theory of Reasoned Action), it is a model to describe and predict the behavior of the information technology users. This model behavior is to attitude and behavior intent of even the relationship between the users of information technology adoption research to expand it<sup>2</sup>. Davis has been described as using perceived usefulness and the perceived ease of use that the factors related to the main variable in this attitude is formed by receiving information technology affect the actual behavior. However, TAM has been criticized for oversimplifying that the choice of consumers but is a very useful model perceived ease of use and perceived usefulness to explain technology adoption<sup>3</sup>. On the other hand, ETAM (Expanded Technology Acceptance Model) is perceived usefulness and perceived use of ease in addition to a variety of external factors, attitudes and purchase intent can be described<sup>4,5,6</sup>, the type of consumption value can be the external factors affecting the perceived ease of use, the perceived usefulness and purchase intent<sup>5,6</sup>. It is also South Korea consumer to understand what the consumption value for drugstore very important to establish retail strategy. Therefore, this study attempts to explore consumers' value and acceptance behavior towards Korean drugstore by applying ETAM (Expanded Technology Acceptance Model).

## II. THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

### A. Korean Drugstore and Consumer Behavior

Generally drugstore refers to a complex store of limited-line assortment in South Korea Pharmaceuticals, cosmetics household goods, health care to evenly handle food, which is different to the supermarket and convenience store<sup>7</sup>. This means that you can see the one-stop retailers specializing in health and beauty oriented needs of consumers who want to buy products of drug, food, cosmetics were bought separately. Main customer base of drug store is to treat 20-30 young women, drugstore is located in the downtown improving the accessibility of consumer and treats specialized product line to be based on health, beauty, convenience. However, the generalized definition for the drugstore does not yet exist in South Korea. The reason is because a low share of the domestic market in the drugstore retail industry, another reason is because the distribution companies are to make frequent reformat on the retail strategy<sup>8,9</sup>. Recently, Korean drugstore can be divided into type of convenience-oriented and the pharmacy-oriented. it is reformatted to suit domestic retail distribution environment<sup>8,10</sup>. Drugstore of yet domestically does not establish the store identity is recognized as a simple general store. Drugstore is to become positioning as a retail store specializing in health and beauty product lines build retail strategy based on the values and attitudes of domestic consumers need. In this study, ETAM (Expanded Technology Acceptance Model) is hired to analyze consumer behavior on the Korean drugstore.

### B. TAM and ETAM

When improves the perceived ease of use in terms of improving performance, perceived ease of use will have a direct effect on perceived usefulness. So the perceived usefulness and perceived ease of use in TAM reported as a separate but related constructs<sup>2</sup>. Davis has been described as using perceived usefulness and the perceived ease of use that the factors related to the main variable in this attitude is formed by receiving information technology affect the actual behavior. TAM is user to receive or resist information technology, external factors are presented to the ETAM claims to be able to describe the process affecting the user's beliefs, and the attitude in use. That is also a variety of external factors, according to their use ETAM, attitude, factors such as the perceived usefulness and perceived ease of use can have a more direct impact<sup>4</sup>. In this study, based on a conceptual model of ETAM, two factors of the traditional TAM, that is perceived ease of use and the perceived usefulness, the consumption value was used as an external factor affecting two factors. Due to its health and beauty products are characterized by typical shopping product sold in the Korean drugstore, purchase intention of consumers to these products it tend to have relatively more affected by external factors<sup>11</sup>. Expanded technology acceptance model is perceived usefulness and perceived use of ease in addition to a variety of external factors, attitudes and purchase intent can be represented and the consumption value can be the external factors affecting the perceived ease of use, the perceived usefulness

and purchase intent. The concept of consumption value include that motive, emotion, experience, self-efficacy, and personal traits<sup>5,6</sup>.

**C. Consumption Value, Ease of Use and Usefulness, Purchase Intention**

Consumption value is related to specific product or service being considered and to the perceived utility of the product<sup>12,13</sup>. Thus consumption value is a pre-purchase phenomenon, in contrast to satisfaction, which is a post-purchase phenomenon<sup>14</sup>. According to Sheth et al.<sup>13</sup>, distinguished five consumption value dimensions: functional, social, emotional, epistemic, and conditional. Functional value relates to the functional usability of product attributes and their utilitarian benefits. Utilitarian consumption serves to perform practical tasks. Social value relates to the perceived product utility that is acquired from product’s positive associations with consumer’s personal geographic, demographic, socioeconomic, political and cultural dimensions, and from positive recognition of product attributes in social groups to which consumer belongs or intends to belong. Emotional value can be acquired from the product’s ability to elicit feelings and change emotional stage while consumption. It is usually associated with the consumption of esthetic and hedonic products, such as perfume or cosmetic. Emotional value consumption should make consumer feel good and delighted, give pleasure and sense of joy, and bring happiness. Epistemic value relates to the human curiosity and natural need for the cognition. Conditional value occurs when product’s utility depends on a particular situation or circumstances under which the product is purchased<sup>4,13</sup>. Based on previous studies, this study is divided into four dimensions of consumption values; economic, convenience, hedonic and social value.

This study examines that consumer’ consumption value has impacts on purchase intention with mediating perceived ease of use and perceived usefulness. Therefore, this study suggests hypothesis as following.

- H1 : Consumption value will have a positive effect on Perceived Ease of Use.
- H1-1 : Economic value will have a positive effect on Perceived Ease of Use.
- H1-2 : Social value will have a positive effect on Perceived Ease of Use.
- H1-3 : Convenience value will have a positive effect on Perceived Ease of Use.
- H1-4 : Hedonic value will have a positive effect on Perceived Ease of Use.
- H2 : Consumption value will have a positive effect on Perceived Usefulness.
- H2-1 : Economic value will have a positive effect on Perceived Usefulness.
- H2-2 : Social value will have a positive effect on Perceived Usefulness.
- H2-3 : Convenience value will have a positive effect on Perceived Usefulness.
- H2-4 : Hedonic value will have a positive effect on Perceived Usefulness.
- H3 : Perceived Ease of Use will have a positive effect on Perceived Usefulness.

Based on consumer technology adoption in accordance with the theory of rational behavior it can predict the degree of use of the present study was to measure the purchase intention order used to predict consumer behavior to target the drugstore visit. purchase intention of customer and continue to the possibility to use the current service provider in the future, and past experience with buying the current products or services on the basis of expectations about the future because it means the intention of using consumer purchase behavior the maintenance of the prediction and the customer has a significance <sup>15</sup>. Therefore the following hypothesis is proposed as below and the hypothesized relationships we investigate are shown in Figure 1.

- H4 : Perceived Ease of Use will have a positive effect on Purchase Intention.
- H5 : Perceived Usefulness will have a positive effect on Purchase Intention.

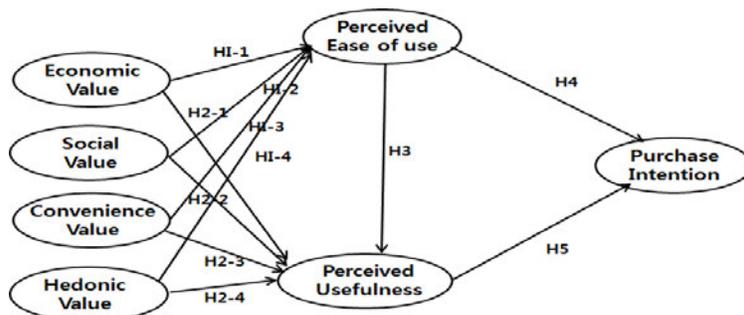


Figure 1: Research Model

### III. RESEARCH METHODOLOGY

In order to investigate the hypotheses, a questionnaire was performed. A total number of 280 questionnaires were answered by shoppers of Korean drugstore. This study used final sample of 267 respondents eliminating 13 with the missing data. This study measures the constructs using multi-item scales adapted from the previous literature. A 7-point Likert scale was used.

The major demographic profile of the respondents is shown in table 1. The female/male ratio of the sample was 74.2(n=198)% and 25.8(n=69)%, respectively. In the sample, 4.9(n=13)% were in their 10s, 39.3(n=105)% were in their 20s, 30.0(n=80)% were in their 30s, 24.0(n=64)% were in their 40s, 1.8(n=5)% were in their over 50s.

The job ratio of the sample was students 33.7(n=90)%, professional/office 27.7(n=74)%, housewife 26.2(n=70)%, self-employ 6.4(n=17)% appeared in order of size. The frequency ratio of the sample was 1-2 55.4(n=148)%, 3-4 30.7(n=82)%, over 4 13.9(n=37)%, appeared in order of size. The self-administered questionnaire included seven constructs. The constructs in the study were measured using multi-item scales mostly adapted. The survey instrument was developed by adopting existing validated questions wherever possible.

Table 1: Demographic Profile of Sample

Variables		Frequency	Ratio(%)
Gender	Female	198	74.2
	Male	69	25.8
Age	10's	13	4.9
	20's	105	39.3
	30's	80	30.0
	40's	64	24.0
	over 50's	5	1.8
Job	Professional/Office	74	27.7
	Self-employ	17	6.4
	Student	90	33.7
	Housewife	70	26.2
	etc	16	6.0
frequency/months	1-2	148	55.4
	3-4	82	30.7
	over 4	37	13.9

### IV. RESULTS

#### A. Reliability and Validity of Measures

The measurement model was examined by SPSS 21.0 and AMOS 19.0. In order to test validity, a confirmatory factor analysis was performed. Confirmatory factor analysis shows good fit between the data and the construct of scale( $\chi^2=189.020$ ,  $df=165$ ,  $p=.000$ ,  $GFI=0.919$ ,  $RMR=0.019$ ,  $AGFI=0.928$ ,  $NFI=0.930$ ,  $IFI=0.981$ ,  $CFI=0.974$ ).

Table 2 shows the analysis of measures of the questionnaire, including standard factor loadings, construct reliability, and average variance extracted(AVE).

The composite reliability from all the constructs ranged from 0.911 to 0.939, exceeding the recommended 0.8 criterion.

The AVE of each latent factor ranged from 0.744 to 0.793, more than the recommended value of 0.5, suggesting that the constructs are distinct. All these criteria show sufficient item validity and reliability<sup>16,17</sup>. Further, in order to test discriminant validity, Hair et al.<sup>18</sup> suggested that the square root of AVE should be greater than the correlation between every construct.

Table 2: Convergent Validity and Reliability

Construct	Item	Estimate	Std. Estimate	t-value	p-value	Composite Reliability	AVE
Economic value	EV1	1.000	0.682	-	-	0.939	0.793
	EV2	1.058	0.787	11.918	***		
	EV3	1.078	0.709	11.167	***		
	EV4	1.128	0.787	12.021	***		
	EV5	1.104	0.767	11.783	***		
Social value	SV1	1.000	0.802	-	-	0.929	0.767
	SV3	0.977	0.795	14.988	***		
	SV4	1.021	0.846	16.065	***		
	SV5	1.053	0.832	15.770	***		
Convenience value	CV1	1.000	0.730	-	-	0.911	0.744
	CV2	1.114	0.754	11.667	***		
	CV3	0.880	0.645	10.532	***		
	CV4	0.902	0.672	10.976	***		
Hedonic value	HV1	1.000	0.751	-	-	0.920	0.771
	HV2	1.069	0.806	10.765	***		
	HV3	1.025	0.770	10.221	***		
Notes: $\chi^2=189.020$ , $df=165$ , $p=.000$ , $GFI=0.919$ , $RMR=0.019$ , $AGFI=0.928$ , $NFI=0.930$ , $IFI=0.981$ , $CFI=0.974$							

As indicated in Table 3, the square root of the AVE of each construct was larger than the correlation of the specific construct with any of the other constructs in the model and exceeded the cutting value of 0.5(19), demonstrating discriminant validity. In order to investigate the hypotheses, a questionnaire was performed. A total number of 280 questionnaires were answered by shoppers of Korean drugstore. This study used final sample of 267 respondents eliminating 13 with the missing data. This study measures the constructs using multi-item scales adapted from the previous literature. A 7-point Likert scale was used.

Table 3: Discriminant Validity

	1	2	3	4
Economic value(1)	<b>0.787</b>			
Social value (2)	0.265**	<b>0.767</b>		
Convenience value (3)	0.258**	0.270**	<b>0.744</b>	
Hedonic value (4)	0.237**	0.329**	0.296**	<b>0.771</b>
Notes: The square root of the average variance extracted (AVE) values are presented on the diagonal and Correlations are below diagonal. **p<.01				

**B. Structural Analysis and Hypotheses Testing**

The structural model created indicated acceptable goodness-of-fit-measures ( $\chi^2=160.07$ ,  $d.f.=103$ ,  $p=0.000$ ,  $GFI=0.975$ ,  $AGFI=0.945$ ,  $RMR=0.010$ ,  $TLI=0.967$ ,  $NFI=0.965$ ). Consequently, these results indicated that the structural model shown adequately fitted the data. Table 4 shows the results of hypotheses in this study.

H1-1, H1-3, H1-4 stated that consumption value will have a positive effect on consumers' perceived ease of use on drugstore. The results supported the hypothesis, with a significant path coefficient of 0.26, 0.33, and 0.22. On the other hand, social value is not found relationship with perceived ease of use, Therefore, H1-2 is not supported. H2-1, H2-3, H2-4 stated that consumption value will have a positive effect on consumers' perceived usefulness on drugstore. The results supported the hypothesis, with a significant path coefficient of 0.19, 0.27, and 0.22. On the other hand, social value is not found relationship with perceived usefulness and H2-2 is not supported.

Especially economic, convenience and hedonic value effected significantly on perceived usefulness. Also, perceived usefulness is found to be the most important factor for predicting behavior intention, with a significant path coefficient of 0.39.

Therefore H3 is supported. On the other hand, perceived ease of use effect on purchase intention is not supported (H4). Finally, H5 are supported with a significant path coefficient of 0.33.

Table 4: Hypothesis Test Result

Hypothesis Path				Hypothesis Direction	Std. Estimate	C.R.	p-value	Result
H1-1	Economic Value	→	Perceived ease of use	+	0.23	5.91	***	Supported
H1-2	Social Value	→	Perceived ease of use	+	0.04	0.94	0.397	Rejected
H1-3	Convenience Value	→	Perceived ease of use	+	0.33	8.85	***	Supported
H1-4	Hedonic Value	→	Perceived ease of use	+	0.28	7.39	***	Supported
H2-1	Economic Value	→	Perceived Usefulness	+	0.19	4.55	***	Supported
H2-2	Social Value	→	Perceived Usefulness	+	0.04	0.86	0.214	Rejected
H2-3	Convenience Value	→	Perceived Usefulness	+	0.27	6.06	***	Supported
H2-4	Hedonic Value	→	Perceived Usefulness	+	0.22	5.51	***	Supported
H3	Perceived ease of use	→	Perceived Usefulness	+	0.39	10.32	***	Supported
H4	Perceived ease of use	→	Purchase Intentions	+	0.08	1.87	0.736	Rejected
H5	Perceived Usefulness	→	Purchase Intentions	+	0.33	9.00	***	Supported

Notes:  $\chi^2=160.07$ , d.f.=103, p=0.000, GFI=0.975, AGFI=0.945, RMR=0.010, TLI=0.967, NFI=0.965

## V. CONCLUSION

The objective of this study is to find consumption value of Korea drugstore and understand of consumers' adoption behavior based on ETAM. The theoretical contribution of this study is as follows. There are some previous studies applying technology acceptance model or theory of planned behavior in context of mobile service, but consumers' perception cannot be explained just by technology acceptance model. On the other hand, this study applied expanded technology acceptance model. In this study, based on a research model of ETAM presented four factors that is consumption value, perceived ease of use and the perceived usefulness, purchase intention.

Also this study focused on four external factors (economic, social, convenience and hedonic value) affecting two mediating factors (perceived ease of use, the perceived usefulness). Because Korea's drugstore is a retail store with a limited assortment of only cosmetics, health products, and foodstuffs, so it is affected by external factors when consumers buy products.

The implications that this study shows are as follow. First, the consumption values of Korean consumers turned out to be hedonic value, convenience value, and economic value, rather than social value. Especially, in Korean drugstore, typical shopping products take the central place. And also, when consumers purchase typical shopping products, consumers tend to focus on hedonic and economic value over social value.

Secondly, perceived usefulness, rather than perceived ease of use, has been shown to be critical mediating effect among the variables.

The results of the study show that perceived ease of use significantly affects consumption values but there is no significant effect on purchase intention, while perceived usefulness have significant effects on the both of them, consumption values and purchase intention. This may be explained from the fact that the main consumers of drugstore are females of 20s and 30s, who would evaluate usefulness over ease of use.

In the further study, the study needs to be extended to the relationship of the image congruence between consumption values and store attributes, and purchase intention. And this will suggest more critical implications to the distribution industry.

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# The Effect of HR Function on Job Satisfaction: The Moderating Role of Employee-Centered Culture

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## Abstract---

**Background/Objectives:** The study pursues to investigate the effect of HR function on job satisfaction. In particular employee-centered culture is expected to moderate the relationship.

**Methods/Statistical Analysis:** A corporate panel survey data are used to test the hypotheses. The data included 500 firms representing manufacturing, banking, and non-banking service industries. After excluding banking and non-banking service firms, the final sample was composed of 369 manufacturing firms. Prior to proceeding hypothesis testing, factor analysis was conducted. To test the research hypotheses, this study utilized several regression analyses.

**Findings:** The results of this study indicated that HR function was positively related to job satisfaction. This positive impact suggested that if HR department participates on decision-making related to business strategy formation and contribute business performance, employees become more satisfied with their job or organization. Thus HR department influenced strategic decisions which top management team including CEO design and implement to achieve business goals and sustain its success. The result of this study indicated that the relationship between HR function and job satisfaction was moderated by employee-centered culture. Favorable perception of organizational culture from employees' experience on work policies, practices, climates, communication, and relations among members strengthened the relationship between two variables.

**Improvements/Applications:** When HR functions fit other systems and culture, the effects are enhanced. The results support the findings of strategic HRM. In the practical standing point, employees evaluate organizational systems and its culture at the same time, they want that organizational policies, systems, and culture are congruent with each other.

**Keywords---** HR Function, Employee-Centered Culture, Job Satisfaction, Moderating Role.

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## I. INTRODUCTION

Corporates' human resource function is a systematic process which plays in determining the survival, effectiveness, and competitiveness of businesses. Human resource management (HRM) refers to the policy, practices, and systems which influence individuals' attitudes, behaviors, and performance<sup>1</sup>. HR functions include analyzing and designing work and job, determining HR supply and demand, recruiting potential employees, selecting employees, training employees how to perform their job and preparing them for the future job requirements, evaluating their performance, rewarding employees based on the results of evaluation, and building a positive work environment. Administrative tasks of HR functions are decreasing and its roles as advocates for employees, change agents, business partner, and architect designers are increasing.

The impacts of HR functions on employees' attitudes and performance has been a pervasive area of research for several decades<sup>2,3,4</sup>. Although the prevailing evidence on the relationship between HR functions and organizational effectiveness has been advocated, very limited number of studies has been conducted on conditions which have influenced the associations. It is required to expand our knowledge on the impact of HR functions on organizational effectiveness while the studies investigate the contexts or conditions possible to influence the relationship.

In this study, organizational culture, especially employee-centered culture, is derived to examine the conditions where the impact of HR functions on job satisfaction reinforces or decreases. Organization culture influences overall systems and its performance. Employee-centered culture is characterized as the organizational value systems and assumptions which prioritize employees among several resources or alternatives when the organization needs to formulate its business strategies and implement the strategies to gain competitive advantages. McGregor advocated that organization practices were determined by their perspectives or approaches toward people who worked daily and contributed their performance<sup>5</sup>. If organization sees employees as people who liked to work diligently, engage their works, motivate autonomously in the case that organization appropriately allocate employees jobs or duties, and treat favorably<sup>6</sup>. But when organization treats its employees with a negative perspective, organization' systems and practices could not motivate employees to work effectively or efficiently.

In this vein, this study investigates the impact of HR functions on employees' job satisfaction. Job satisfaction has been one of the most pervasive themes in the field of management because job satisfaction is a critical indicator to predict employees' performance which contribute overall organizational performance or effectiveness. Thus this study examines the role of employee-centered culture. The culture influences the relationship between HR function and employees' job satisfaction. This study is undertaken to explore the answers to the following two research questions:

Research question 1: Is there any association between corporate HR functions and employees' job satisfaction?

Research question 2: Does employee-centered culture influence the relationship between corporate HR functions and employees' job satisfaction?

## II. THEORETICAL BACKGROUND AND HYPOTHESIS

### A. HR Function and Job Satisfaction

HR function refers to the policy and practices which affect employees' attitudes and behaviors. HR function includes analysis and design of works HR planning, recruitment, selection, placement, training and development, performance management, evaluation, and reward roles<sup>1</sup>.

Organizations are first necessary to identify the outputs of work, to determine the quality and quantity criterions for those work outputs. Based on the outputs, organizations need to analyze the transformation process and input resources to gain desirable outputs. These analyses of work provide an overview of the dynamic relationship among works which individuals or teams perform to achieve their common goals.

Organizations need to attain talent when there is a labor shortage, and at the same time to control when there is a labor surplus. To do so, organizations need to have a clear idea of their configuration of human resources. Organizations must know where they are and where they are going to sustain their competitiveness in the market. Recruitment refers to the practices or activities to identify and attract

potential employees. Prior to recruitment, organizations need to identify the nature of the vacancies for which employees are recruited.

Selection is the process which organizations decide who will or will not be hired into them. In order to choose the most capable talent, organizations must have systematic and strict methods of selection. The selection methods are necessary of the features such as reliability, validity, generalizability, utility, and legality<sup>1</sup>. Reliability is defined as the consistency of performance measure which is free from random error. Validity refers to the degree to which a measure assesses all the relevant aspects of job performance. Generalizability is the extent to which a selection method established in one context applies to other contexts including jobs and works. Utility is the extent to which a selection method increases the bottom-line effectiveness of the organization. Legality means that organizations must comply with laws and legal precedents when they design and implement selection methods.

Training is a planned method to provide employees to learn what they need to hold knowledge, skills, and attitudes to meet job requirements. More recently, organizations establish a learning organization system which facilitate employees' learning and encourage the learning to share among employees. The first step of training is assessing the training needs which are used to determine if training is necessary to overcome performance problems. Most organizations evaluate the results or outcomes of training to decide whether the training program is effective or efficient and whether the training program is implemented continuously. If the training program is not effective or does not achieve a desirable goal, organizations must redesign or redevelop the program.

Performance management is a process to identify employees' strengths or weaknesses, link employees to appropriate training programs, and reward performance. Organizations also utilize the information of performance management in administrative decisions. For example, According to the performance evaluation, organizations determine who is promoted or whose payroll is increased. HR function is not separate, but is integrated among sub-functions. If sub-functions are not consistent with HR policies and systems, employees do not trust capabilities and intents of organization toward human resource management. Job satisfaction is a pleasurable emotional state which results from job experiences<sup>7</sup>. It shows how employee feels about his or her job and what they experience during daily works<sup>6</sup>. The construct of job satisfaction includes several aspects of job.

There are pay, promotion, supervision, coworker, and the work itself. Pay satisfaction refers to employees' feelings about their pay to whether it is as much as they deserve, secure, and appropriate for normal expenses and exceptional items. Pay satisfaction of employees is grounded on the comparison of the pay that employees receive and they want to receive. Thus, employees compare their pay level with others.

Promotion satisfaction refers to employees' feelings about policies and execution of promotion in terms of fairness. Supervision satisfaction is employees' feeling about their managers or boss in terms of competence, politeness, and communication. Coworker satisfaction is employees' feeling about whether coworkers are competent, responsible, and helpful. Also employees have general feeling about their work itself on whether work is challenging, interesting, and meaningful.

HR systems influence employees' motivation levels, and in turn their attitudes and performance related to job<sup>8</sup>. Employees' job satisfaction can be a competitive resource because human resources of organizations cannot be easily imitated and substituted by competitors. If organization treats employees as valuable or favorable resources, and provides ample supports, they perceive that they become critical success factor in the organization<sup>2,3</sup>. Employees will try to meet with organization's needs and have positive feeling about their job including various aspects.

There are evidences that when organizations have good selection method and training programs, and provide employees to obtain and develop their talents, employees have more positive attitudes on their job in Korea<sup>9</sup>. Employees who work in SMEs in Korea were more satisfied with their jobs or organization when their organization had favorable HR functions toward employees<sup>10</sup>. Sound HR functions are positively related to job satisfaction.

Based on the notion, the hypothesis is as follows:

H1. HR function will positively affect job satisfaction.

**B. The Moderating Effect of Employee-Centered Culture**

Organizational culture refers to the shared beliefs and attitudes to the organization. Employees build desirable attitudes and behaviors while they perform their job requirements and interact with other members. If organization perceive employees valuable resources and provide favorable climate, employees respond with the ways which organization deals with them. In this reason, employee-centered culture will add the impact of HR functions on job satisfaction<sup>6</sup>.

Organizations which have employee-centered culture are characterized with favorable and supportive supervisors, fair organization systems, clear work process and collaborative work teams. Employees experience organization climate while they implement their job requirements and communicate with supervisor and coworkers. Also they evaluate the ways or means which their works are related to and assessed to achieve common goals.

In particular, scholars in the field of strategic HRM address the importance of internal fit among HRM functions. A systematic process of recruitment and selection must be associated with performance management and evaluation system. If sub functions of HRM system are not congruent each other, effectiveness of individual sub HR function decreases. In the situation, employees cannot believe that organization authentically treat them and have competence to deal with issues related to human resources. HR functions as a system influence employees' attitudes and performance. The impact can be reinforced or inhibited by organizational culture. Based on the notion, the hypothesis is as follow:

H2. Employee-centered culture will moderate the relationship between HR function and employee job satisfaction.

**III. RESEARCH METHOD**

**A. Sample and Data Collection**

The present study used Human Capital Corporate Panel (HCCP) data collected by Korea Research Institute of Vocational Education and Training (KRIVET) in 2011. The HCCP data included 500 firms representing manufacturing, banking, and non-banking service industries. After excluding banking and non-banking service firms, the final sample was composed of 369 manufacturing firms.

**B. Measures**

The study included three variables: HR function, employee-centered culture, and job satisfaction. HR function is operationally defined as the degree of contribution and participation of HR department on decision-making related to business strategy, CEO decision making, and organization innovation. Four items were used to measure the variable of HR function. Employee-centered culture is also operationally defined as the degree to which organization favorably perceives employees' value, which was measured with three items. Job satisfaction is operationally defined as employee perception on the job itself, compensation, and social relation in organization including three items. All items had 5-point Likert scales.

**IV. RESULTS**

**A. Descriptive Statistics**

Table 1 shows means, standard deviation, and correlations among all research variables. As seen in the table, HR function had a mean of 3.40(SD=1.00). Employee-centered culture had a mean of 3.39(SD=.85). Job satisfaction had a mean of 3.57(SD=.66). Three research variables had positive and significant correlations with other variables.

Table 1: Descriptive Statistics and Correlations

	Mean	SD	1	2
1. HR	3.40	1.00		
2. Culture	3.39	.85	.381**	
3. Satisfaction	3.57	.66	.303**	.549**

Note: N=10,043, \* p<.05, \*\* p<.01

**B. Hypothesis Testing**

Prior to proceeding hypothesis testing, factor analysis was conducted. Factor loadings yielded 32.78 for HR function, 25.04 for employee-centered culture, and 19.72 for job satisfaction. Cumulative variance for

three research variables was 77.54. Thus all three variables were grouped as like as which the researcher intended without any exception.

Table 2: Factor Analysis

	Factor		
	1	2	3
HR 1	.899	.153	.116
HR 2	.890	.108	.092
HR 3	.878	.177	.119
HR 4	.881	.175	.113
Culture 1	.166	.847	.230
Culture 2	.185	.871	.238
Culture 3	.179	.854	.233
Job 1	.109	.231	.811
Job 2	.124	.363	.641
Job 3	.107	.127	.830
Cum. Var.	32.78	55.82	77.54

Note: N=10,043, HR=HR function, Culture=Employee-centered culture, Job=Job satisfaction. N=

To test the research hypotheses, this study utilized several regression analyses. In the first step, control variables including type of company, size, and benefits were entered to remove their effects on the dependent variables. And then independent variables were entered into the regression analyses as shown in Table 3.

Hypothesis 1 predicted that HR function would be positively related to job satisfaction. As indicated in Model 2 of Table 3, this hypothesis was supported by a significant and positive relationship between HR function and job satisfaction (beta=.114, p<.01).

Hypothesis 2 predicted that the relationship between HR function and job satisfaction would be moderated by employee-centered culture. Interaction was entered into Model 3. The findings for this interaction are displayed, which show that the hypothesis was supported by a significant and positive interaction (beta=.091, p<.01).

Table 3: Regression Analysis

	M1	M2	M3
	beta	beta	beta
Industry	-.065**	-.046**	-.049**
Position	-.033*	.006	.007
Level	.082**	.038*	.039*
Job	.020	.018	.019
Gender	-.073**	-.038**	-.035**
Year	.040	.021	.020
Education	.022**	.011	.009
HR		.114**	.127**
Culture		.486**	.482**
HR*Culture			.091**
R <sup>2</sup>	.022	.308	.316
Δ R <sup>2</sup>		.286	.008
F	21.976**	326.468**	305.182*

Note: \*p <.05, \*\*p<.01

## V. DISCUSSION

### A. Summary

The results of this study indicate that HR function is positively related to job satisfaction. This positive impact suggests that if HR department participates on decision-making related to business strategy formation and contribute business performance, employee become more satisfied with their job or organization. Thus HR department influence strategic decisions which top management team including CEO design and

implement to achieve business goals and sustain its success. The results can be understood with the theories related to strategic HRM <sup>7,8</sup>. Participative HRM practices encourage employees' commitment to organization strategy and business and in turn employees can have ownership on their work as well as organization because their ideas and opinions are reflected to organization. In particular, uncertain business environment renders employee feel worried about their job and organization so that they want to have initiative to determine their individual career and are curious about in which the organization is proceeding under competitive environment. In this situation, competent and reliable HR function reduces anxiety of employees and increases motivation to job.

Further, result of this study indicated that the relationship between HR function and job satisfaction is moderated by employee-centered culture. Favorable perception of organizational culture from employees' experience on work policies, practices, climates, communication, and relations among members strengthened the relationship between two variables. As McGregor advocated <sup>5</sup>, organization' perspective toward people determines all kinds of systems and practices related to human resources. If organization regards employees as distinct and valuable assets, culture as well as HR function includes the characteristics of the perspective. Thus, the effectiveness of all systems and practices increases when each part or function of the organization fit internally <sup>8</sup>.

### **B. Implications**

Exploration of the effects of HR functions on employees' job satisfaction is critical because employee attitudes and behaviors are influenced by organizational systems and policies. In turn they predict employee performance which organizations pursue to achieve its strategic goals and objectives. This study has two implications for theories and practices in terms of HRM.

Research has little known on the conditions how the relationship between HR functions and job satisfaction is enhanced or inhibited. To extend our knowledge on the relationship, this study examined the effect of employee-centered culture. As the results of study shown, the level of job satisfaction increase when organization considers employees valuable resources. When HR functions fit other systems and culture, the effects are enhanced. The results support the findings of strategic HRM. In the practical standing point, employees evaluate organizational systems and its culture at the same time, they want that organizational policies, systems, and culture are congruent with each other. Thus culture can be crucial condition when organization design and implement its HR functions to improve employee performance.

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## Female Consumers' Sunglass-Purchasing Behaviors Based on Types of Lifestyle and Their Priority

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### Abstract---

**Background/Objectives:** Depending on lifestyle factors, people engage in different appearance-management behaviors, thus expressing diversity and individuality. This study aims to look at people's sunglasses-purchasing behaviors depending on their lifestyle.

**Methods/Statistical Analysis:** Given that consumers' priority can be a predictive variable of their purchasing behaviors, this study specifically examined consumers' sunglass-purchasing behaviors. A total of 290 female consumers in their 30s and 40s living in Seoul and metropolitan areas participated from July 11 to Aug. 2, 2015.

**Findings:** The individual was interested in fashion and new trends, willing to try new fashion trends, and willing to buy new products. In addition, consumer group 3 of "fashion/individuality-oriented group," with low conservative-oriented factors showed high fashion, activity, and practicality-oriented factors. In particular, the fashion/individuality-oriented group reported high scores for fashionability/attractiveness, colors/patterns.

**Improvements/Applications:** This study would be helpful for consumers to buy sunglasses by different lifestyle in 30s to 40s groups.

**Keywords---** Lifestyle, Sunglasses, Purchasing behavior, Priority, Fashionability, Attractiveness.

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## I. INTRODUCTION

The advancement of media has increased the role of visual images in influencing people's appearance-management behaviors. Depending on lifestyle factors, people engage in different appearance-management behaviors, thus expressing diversity and individuality. Accessories can influence a person's image, helping to create a sense of uniqueness. A case in point is sunglasses, which cover one of the most important sensory organs<sup>1</sup>.

In addition, sunglasses affect the natural appearance of people's faces, which greatly influences the perception of others. It is also important to note that unlike other accessories, sunglasses provide both style and function<sup>2</sup>.

For these reasons, this study aims to look at people's sunglasses-purchasing behaviors depending on their lifestyle.

For the purpose of this study, lifestyle refers to the way a person's value system and personality are shaped by culture and social class, and how these are reflected through his or her choices and consumption patterns<sup>3</sup>. Lifestyle is not something that is permanent; it reflects a social phenomenon of the time. Market segmentation by lifestyle can be divided into three categories: consumers' activity, interest and opinion<sup>4</sup>. In the process, variables involved in consumers' lifestyle should be considered. Since people's sunglasses-purchasing behaviors can be changed by types of lifestyle, this study suggests that studies should be conducted on people's preferred sunglasses designs.

As the importance of total fashion coordination for unique looks increases, accessories can help to create unique images<sup>5</sup>. Among them, sunglasses look out of fashion very quickly. While its main function is to protect one's vision, it can also be a fashion accessory, changing one's image, improving one's look and determining one's impression. As such, sunglasses can be important variables of purchasing behaviors. In this regard, this study aimed to look at people's sunglasses-purchasing behaviors depending on their lifestyle.

Customers' purchasing behaviors depend on various factors, including their lifestyle, financial status, and priority<sup>6</sup>.

As consumers' characteristics and preferences have become increasingly diversified, their purchasing behaviors have become an important factor in choosing sunglasses.

Given that consumers' priority can be a predictive variable of their purchasing behaviors, this study specifically examined consumers' sunglass-purchasing behaviors.

## II. MATERIALS AND METHODS

### A. Research Topics

Research topic 1: Female customers in their 30s and 40s were grouped based on their lifestyle. Research topic 2: Differences in sunglass-purchasing behaviors of each group were compared and analyzed.

### B. Methods

#### *Measuring Tools*

For this study, a questionnaire was used with measurement variables as follows: 22 questions regarding lifestyle, 4 sunglasses preferences, 10 sunglasses-purchasing behaviors and 4 demographic characteristics. For questions regarding lifestyle<sup>7,8,9,10,11,12</sup> and sunglass-purchasing behaviors<sup>13</sup>, questions used for preceding research were modified and supplemented with a likert scale of 1 to 5, where 1 is "Not at all" and 5 is "Very Much."

#### *Research Samples and Survey*

A simple random sampling method was used for the survey. A total of 290 female consumers in their 30s and 40s living in Seoul and metropolitan areas participated from July 11 to Aug. 2, 2015.

A total of 273 responses, excluding 17 whose responses were not stated, were used for analysis.

Demographic characteristics of the respondents are described in [Table 1].

Table 1: Demographic Characteristics

Factor		Frequency	%
Age	30-34	149	54.6
	35-39	34	12.5
	40-44	50	18.3
	45-49	40	14.7
Marital status	unmarried	140	51.3
	married	133	48.7
Education	high-school graduation	33	12.1
	in college and university	8	2.9
	bachelor degree	54	19.8
	in graduate school	125	45.8
	over graduate school	53	19.4
Job	students	47	17.2
	company worker	108	39.6
	professional	82	30.0
	housewife	17	6.2
	others	19	7.0
Total		273	100.0

**Analysis Methods**

SPSS 22.0 was used for frequency analysis, cross analysis, factor analysis, reliability analysis, cluster analysis and variance analysis. Duncan's test and a X<sup>2</sup> test were also conducted.

**III. RESULTS AND DISCUSSION****A. Factors-Extraction of Life Style**

A principal component analysis and factor analysis with Varimax rotation were conducted to extract factors of lifestyle. For 22 questions, a total of 5 factors with an eigen value of more than 1 were extracted. Variance explained by these factors accounted for 70.22% of the total variance, and the Cronbach's  $\alpha$  value of the 5 factors was from 0.73 to 0.90, providing internal consistency of the questions. The results are shown in [Table 2].

Factor 1 was classified as "fashion-oriented," with questions including whether the individual is interested in fashion and new trends, willing to try new fashion trends, and willing to buy new products. Factor 2 was classified as "ostentation-oriented," with questions including whether the individual prefers buying famous brands even though they are expensive, whether he or she purchases high-quality products, whether he or she places an importance on facial appearance. Factor 3 was classified as "activity-oriented," with questions including whether the individual likes to participate in group activities, and whether he or she is outgoing and comfortable interacting with many people. Factor 4 was classified as "practicality-oriented," with questions including whether the individual buys quality products according to financial planning, without going over his or her budget.

Factor 5 was classified as "conservative-oriented," with questions including whether the individual likes familiarity and does not want change.

Table 2: Analysis of Lifestyle Factors

Factor	Question	Factor loading	Eigenvalue	Variance explained	Reliability
Fashion-oriented	Individual is interested in fashion and new trends, and willing to try new fashion trends.	0.84	6.55	19.09	0.90
	Individual is interested in trends information.	0.83			
	Individual is willing to buy new products, and try changes.	0.77			
	Individual frequently advice fashion (trends) to neighbors.	0.76			
	Neighbors sometimes copy my fashion.	0.72			
	Individual is always conscious of and sensitive to fashion and live around.	0.72			
Ostentation-oriented	Individual prefers buying famous brands even though they are expensive.	0.88	3.53	15.73	0.87
	Individual has more interest and confidence in the famous brands.	0.85			
	Individual tends to choose the one luxury item that you can show off to others than to buy various goods.	0.82			
	Individual tends to buy expensive things or goods of famous brands to save face.	0.82			
	Individual tends to think that quality products are also expensive price.	0.62			
Activity-oriented	Individual likes to participate in group activities.	0.84	2.11	15.19	0.86
	Individual is outgoing and comfortable interacting with friends and family.	0.77			
	Individual actively participate in the meeting.	0.76			
	Individual has been actively involved in the cultural life.	0.75			
	Individual like having a conversation hung out with a lot of people he said.	0.66			
Practicality-oriented	Individual buys quality products according to financial planning, without going over.	0.89	1.93	10.92	0.82
	Individual buys it compiled a list of items needed.	0.78			
	Individual plan to make purchases after investigating the price even small items.	0.75			
Conservative-oriented	Individual likes familiarity and does not want to try something new.	0.80	1.33	9.30	0.73
	Individual dislike big change in life.	0.75			
	Individual likes familiarity and does not want change.	0.61			

**B. Types of Consumer Groups Based on Life Style**

Group analysis was conducted to group consumers based on 5 lifestyle factors. 4 groups were selected for this study after considering significant differences between lifestyle factors. To name the 4 groups reflecting their characteristics, an F-test and Duncan’s test were conducted.

The results are shown in [Table 3]. Consumer group 1 was named the “ostentation/brand-oriented group,” with high ostentation-oriented factors and low activity, practicality, and conservative-oriented factors. Consumer group 2 was named the “fashion-indifferent group,” with the lowest lifestyle factors, aside from conservative-oriented factors, among the 4 groups. Consumer group 3 was named the “fashion/individuality-oriented group,” with low conservative-oriented factors and high fashion, activity, and practicality-oriented factors. Consumer group 4 was named the “conservative/practicality-oriented group,” with the highest factor regarding conservative-oriented factors among the four groups and low fashion, ostentation, and activity-oriented factors.

Table 3: Types of Consumer Groups Based on Lifestyle

Consumer group Lifestyle factor	Ostentation/ brand-oriented(n=74)	Fashion- indifferent (n=52)	Fashion/ individuality- oriented (n=71)	Conservative/ practicality- oriented (n=76)	F-value
Fashion-oriented	0.36B	-0.70C	0.87A	-0.68C	74.80***
Ostentation-oriented	1.08A	-0.54C	-0.59C	-0.13B	79.09***
Activity-oriented	0.05B	-0.70C	0.67A	-0.20B	25.68***
Practicality-oriented	-0.12B	-0.97C	0.45A	0.36A	33.79***
Conservative-oriented	-0.05B	-0.22B	-0.10B	0.30A	3.49**

### C. Sunglasses-Purchasing Priority by Consumer Group

Sunglasses-purchasing priority data by consumer group are shown in [Table 4]. The ostentation/brand-oriented group reported higher scores than other groups regarding design/style and brand reputation. The fashion-indifferent group reported low scores for fashionability/attractiveness, brand reputation, and recognition from others. The fashion/individuality-oriented group reported high scores for fashion ability/attractiveness, colors/patterns, whether it fits well, and the expression of individuality, and low scores for reasonable prices and whether or not after-sales services are offered. The conservative/practicality-oriented group reported higher scores (4.00) than other groups on reasonable prices and moderate scores regarding other purchasing factors.

Table 4: Sunglasses-Purchasing Priority by Consumer Group

Sunglasses-purchasing priority	Ostentation/ brand-oriented (n=74)	Fashion- indifferent (n=52)	fashionability/ attractiveness- oriented (n=71)	conservative/ practicality- oriented (n=76)	F-value
Design/style	4.59A	4.12B	4.49A	4.34AB	4.83*
Color/pattern	4.24AB	4.04B	4.44A	4.13B	4.64*
Harmony with the face shape	4.62B	4.38C	4.94A	4.63B	10.11***
Fashionability/attractiveness	3.86A	2.81C	4.14A	3.51B	28.92***
Brand reputation	3.73A	2.63C	3.58AB	3.25B	12.63***
Quality	3.82BC	3.60C	4.34A	3.95B	11.06***
Reasonable price	3.96	3.90	3.73	4.00	1.49
Fit will and expression of individuality	4.41B	4.08C	4.83A	4.39B	14.39***
Others' evaluation	3.34B	2.92C	3.87A	3.38B	10.46***
After service (chagne, refund, repair)	3.86	3.56	3.58	3.83	2.08

\* $P < 0.5$ , \*\*\* $p < .001$ ,  $A > B > C$  represents the results of Duncan test.

In terms of fashion and behavior, it was reported that the psychosocial factors affecting fashion consumption were examined how these factors interacted with the challenges for sustainable design<sup>14</sup>. A designer should be able to appreciate the interplay of a mix of psychological factors: cognitive, affective and behavioural in order to facilitate better engagement and attachment. The behaviors would affect consumers' satisfaction. Kim and Na suggested that price, product quality, service stability and service diversity had effects on customers' satisfaction, and their satisfaction affected their repurchase intentions, customer service does not affect satisfaction<sup>15</sup>.

## IV. CONCLUSION

The results of this study, which was conducted on 273 female customers in their 30s and 40s living in Seoul and metropolitan areas, are as follows. In this study, the surveyed' marital status was similar and their education was generally high, and they are working at present. In terms of the social norms, subjects belong to a social class that currently leads to make money. This result suggests the possibility of the application and analysis in real life. Customers' lifestyle factors were divided into 5 categories: fashion-oriented, ostentation-oriented, activity-oriented, practicality-oriented, and conservative-oriented. Answers to the questions represented that 30-40s enjoyed activity, for example, a high proportion of frequently attending the club, more sensitive to new fashion/trend than other generations. Consumer types depending on lifestyle were divided into 4 groups: ostentation/brand-oriented group, fashion-indifferent group, fashion/individuality-oriented group, and conservative/practicality-oriented group. In particular, consumer group of the "fashion/individuality-oriented group," showed high fashion, activity, and practicality-oriented factors, which represented similar patterns by leading people of jobs above. Taken together, this study would be helpful for consumers to buy sunglasses by different lifestyle in 30s to 40s groups.

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## A Study on Depression amongst Korean Clinical Nurses

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### Abstract---

**Background/Objectives:** Depression is the most common mental health disorder among clinical nurses. The purpose of this study was to investigate the factors that influence depression among clinical nurses in Korea.

**Methods/Statistical Analysis:** Data were collected through questionnaires using the short form of the depression scale, Korean workplace violence scale, and short version of the peer support scale administered to clinical nurses working at 2 general hospitals in Gyeonggi province in 2015. Answer sheets from 190 respondents were gathered, and 186 of them were analyzed (4 were incomplete). The collected data were analyzed using t-tests, one way ANOVAs, and multiple regression analysis with the SPSS 18.0 statistical program.

**Findings:** Our findings indicated that the level of depression amongst clinical nurses was  $1.74 \pm .55$  points and the level of peer support was  $3.64 \pm .65$  points. In correlation analysis, depression was significantly correlated with peer support ( $r = -.36, p < .001$ ), violence from customers ( $r = .45, p < .001$ ), violence from coworkers and supervisors ( $r = .38, p < .001$ ), guidelines and policies regarding violence ( $r = -.21, p < .001$ ), and protective and therapeutic support ( $r = -.25, p < .001$ ). In multiple regression analysis for the prediction of depression, peer support ( $t = -3.400, p < .001$ ) and violence from customers ( $t = 4.063, p < .001$ ) and violence from coworkers and supervisors ( $t = 2.114, p < .001$ ) were found to be factors significantly associated with depression. These variables explained 33.3% of depression among clinical nurses.

**Improvements/Applications:** Hospital administrators should assess depressive symptom exhibited by nurses and also monitor workplace violence factors that influence depression. Moreover, to lower the incidence of depression, preventive policies against workplace violence should be instituted

**Keywords---** Depression, Workplace Violence, Peer Support, Clinical Nurse.

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## I. INTRODUCTION

Depression refers to a prolonged negative feeling and is a critical mental health problem characterized by persistent low mood and a loss of interest or pleasure in normally enjoyable activities<sup>1</sup>. Depressed people often cannot control their emotions, and they show an inability to concentrate or function normally. The symptoms last for a long time. Nurses suffer depression at twice the rate of the general population<sup>2</sup>. Depression impacts 9.4% of the adult population in the United States, but 18% of nurses<sup>2</sup>. Another recent study suggested that nurses in Hong Kong were more depressed, anxious, and stressed than were the local general population<sup>3</sup>.

In Korea, 16.8% of women and 9.1% of men experienced depressive symptoms for a year<sup>4</sup>. Korean nurses were more depressed and, by the depression criteria, the prevalence of different levels of depression in nurses was 11.2% for pre-depression, 5.7% for moderate and 4.6% for severe depression;<sup>5</sup> another study showed that moderate depression occurred in 22.5% of hospital nurses<sup>6</sup>. According to other research, 56% of clinical nurses in Korea had mild or major depressive symptoms<sup>7</sup>. Given these results, the levels of depression in South Korean nurses is likely to be high. In particular, nurses who experienced relatively higher levels of depressive symptoms included those in their 20s, those who have been employed for short periods of time, and those who are not married<sup>7</sup>.

Nurses with depression not only suffer themselves, but their depression may have an impact on their workmates and potentially on the quality of care they provide<sup>2</sup>. Furthermore, depression may impact absenteeism as well as turnover intention<sup>8-9</sup>.

Previous studies reported associations between depressive symptoms and job-related stress, burnout, marital status, and lack of professional rewards<sup>10-12</sup>. Depression can be triggered by factors associated with work<sup>12-13</sup>. One of those factors is workplace violence. Workplace violence is a serious and problematic phenomenon in health care settings.

Workplace violence refers to personal or group action consisting of offensive or senseless behaviors continuously exhibited in the workplace<sup>14</sup>, and it includes verbal, non-verbal, and physical abuse or humiliation. Many studies have shown that nurses are at the highest risk of being targets of such violence<sup>15-16</sup>. According to a previous study, the fact that many nurses experience violence is not a new phenomenon. Many hospital nurses (49.6%) had experienced at least one episode of any type of violence; many nurses (19.1%) had been exposed to physical violence, while more (46.3%) had been exposed to non-physical violence<sup>15</sup>.

98.1% of clinical nurses in South Korea had experienced violence in the past year. The violence consisted of 44.4% physical threats, 37.5% verbal violence, and 18.1% physical violence and, also, there were positive correlations among the experience of violence and depression<sup>16</sup>. Therefore, the researcher emphasized the necessity of setting up guidelines for clinical nurses to curtail violence<sup>16</sup>.

Medical institution accreditation criteria emphasize employee health and safety as important evaluation criteria.

Specifically, the criteria include means of controlling health-related disorders that arise from physical fatigue and mental stress<sup>17</sup> and prevention of abusive language and violence within the workplace<sup>18</sup> as important evaluation details.

For hospital development and growth, it is essential to offer an environment in which employees can exert their capabilities to the fullest.

Also, an environment in which all members can mutually coordinate with one another and have their efforts be integrated to achieve optimal performance should be shaped<sup>19</sup>.

Thus, in the current study, we are interested in examining the factors that influence depression among clinical nurses in Korea.

## II. RESEARCH METHOD

### A. Study Design

This study utilized a cross-sectional research design to investigate the factors that influence depression among clinical nurses in general hospitals.

## **B. Samples**

The subjects of this study were registered nurses working in general hospitals, and the survey was conducted in 2015.

The answer sheets from 190 respondents were gathered, and 186 of them were analyzed after excluding 4 incomplete ones.

## **C. Measurements**

### ***Depression: Short Version***

The depression scale used to measure the level of depression among clinical nurses was developed by Kim and Ann (2006)<sup>20</sup>.

The scale consisted of a total of 8 items, which included items on feelings of sadness and hopelessness. The items were rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Higher scores indicate a higher level of depression. Cronbach's alpha for depression in this study was .89.

### ***Workplace Violence***

The Korean workplace violence scale (K-WVS) was developed as a 24-item inventory by Jang et al (2013)<sup>21</sup> and the current study used the K-WVS amended by Kim (2016)<sup>22</sup>.

The amended scale consisted of a total of 19 items, 4 in the domain of violence from customers, violence from co-workers and supervisors, violence management and violence-related policies, and organizational protective system.

The items were rated on a 4-point Likert scale (1 = not experienced, 4 = often experienced). Higher scores indicated a higher violence experience level.

Cronbach's alpha for workplace violence in this paper was .90.

### ***Peer support: Short Version***

The Peer Support Scale, developed by Lee and Shin (1997)<sup>23</sup>, was intended to measure the perceived support felt by adolescent's from their peers. There were a total of 5 items, which included emotional support and encouragement from friends. The items were rated on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Higher scores indicated a higher level of peer support. Cronbach's alpha for peer support in this paper was .93.

## **D. Data Collection**

Data collection was carried out on March 7-8, 2015. The subjects of this study were the students in N university, and the survey was conducted during a member's training for the new semester in 2015.

## **E. Data Analyses**

The collected data were analyzed with the SPSS18.0 statistical program. Descriptive statistics for all study variables as well as the reliability assessment of the study instruments were computed. To analyze the differences in the independent and dependent variables, t-tests and Oneway ANOVA were used. The factors that influenced depression were analyzed using multiple regression analysis.

## **F. Ethical Considerations**

Prior to data collection, the study subjects provided informed consent. Participants also received information on this study, including its purpose, potential risks and benefits, and the data collection procedures. Individuals who were reluctant to participate in this study could refuse to participate at any time.

## **G. Limitations**

This study was constricted by convenience sampling, which limits generalization to a broad population.

### III. RESULTS

#### A. Participant Characteristics

The baseline characteristics of the study participants are shown in Table 1. The mean age of the participants was 31.25 years. One hundred eighty one nurses (97.3%) were female. Their educational background was as follows: 121 nurses (65.4%) had diplomas; 60 nurses (32.4%) had bachelor's degrees; and 4 nurses (2.25%) had completed more than graduate school. Of the 186 participants, 118 (63.4%) were single. Regarding department, 93 (50.0%) of the participants worked in the general ward and 26 (14.0%) were outpatient nurses. Of the 186 participants, 4 (2.2%) worked in intensive care units and 63 (33.9%) worked in other units.

Of the 186 participants, 19 (10.7%) earned less than 2 million won per month; 115 (64.6%) earned 2 - 2.5 million won; 36 (20.2%), earned 2.5 - 3.4 million won; and 9 (4.5%) earned more than 3.5 million won per month.

In terms of religion, 69 nurses (37.7%) were Christian and 20 nurses (10.9%) were Catholic. The average number of drinks per week consumed by the participants is shown in Table 1. Sixty nurses (32.2%) almost never drank; 62 nurses (33.3%) drank less than once per week; 36 nurses (19.4%) drank once a week; 21 nurses (11.3%) drank 2 to 3 times per week; and 7 nurses (3.8%) consumed four or more drinks per week.

Table 1: General Characteristics  
(N=186)

Variable	Category	n(%), Mean±SD
Age		31.25±6.92
	20~29	82(44.6)
	30~39	77(41.8)
	≥40 years old	25(13.6)
Gender	Male	5(2.7)
	Female	181(97.3)
Educational background	Diploma(3 years)	121(65.4)
	Bachelor (4 years)	60(32.4)
	≥ Graduate school	4(2.2)
Marital state	Single	118(63.4)
	Married	68 (36.6)
Department	General ward	93(50.0)
	Outpatient	26(14.0)
	Intensive care unit	4(2.2)
	The Others	63(33.9)
Income (per month)	< 2 million won	19(10.7)
	2 ~ 2.5 million won	115(64.6)
	2.5 ~ 3.5 million won	36(20.2)
	> 3.5 million won	8(4.5)
Religion	Christianity	69(37.7)
	Catholic	20(10.9)
	Buddhism	7(3.8)
	None	87(47.5)
Alcohol drink	Nearly not	60(32.2)
	< Once per week	62(33.3)
	Once per week	36(19.4)
	2~3 times per week	21(11.3)
	≥ 4 times per week	7(3.8)

### B. Descriptive Statistics for Variables

Descriptive statistics regarding depression, peer support, violence from customers, violence from coworkers and supervisors, guidelines and policies regarding violence, and levels of protective and therapeutic support are shown in Table 2. The average level of depression was  $1.74 \pm .55$  points (range, 1-4) and the level of peer support was  $3.64 \pm .65$  points (range, 1-5). The level of violence from customers was  $1.58 \pm .48$  points (range, 1-4). The level of violence from coworkers and supervisors was  $1.19 \pm .36$  (range, 1-4). The guidelines and policies for violence were given an average score of  $1.74 \pm .76$  (range, 1-4). The level of protection and therapeutic support was  $2.39 \pm .74$  (range, 1-4).

Table 2: Descriptive Statistics for Variables

Variable	Category	Mean $\pm$ SD
Depression (1~4)		1.74 $\pm$ .55
Peer support (1~5)		3.64 $\pm$ .65
Workplace violence (1~4)	Violence from customers	1.58 $\pm$ .48
	Violence from coworkers, supervisors	1.19 $\pm$ .36
	Guideline & policy for violence	1.74 $\pm$ .76
	Protection and therapeutic support	2.39 $\pm$ .74

### C. Depression According to General Characteristics

Table 3 shows levels of depression according to general characteristics. There were no significant differences given age, gender, educational background, marital status, departments, income per month, religion, or alcohol consumption.

Table 3: Depression According to General Characteristics

Variables	Categories	Mean $\pm$ SD	t or F	P
Age	20-29	1.77 $\pm$ .52	.808	.447
	30-39	1.75 $\pm$ .59		
	$\geq$ 40 years old	1.61 $\pm$ .48		
Gender	Male	1.82 $\pm$ .58	.366	.715
	Female	1.73 $\pm$ .55		
Educational Background	Diploma	1.75 $\pm$ .55	.931	.396
	Bachelor	1.74 $\pm$ .54		
	$\geq$ Graduate school	1.37 $\pm$ .27		
Marital status	Single	1.77 $\pm$ .57	1.301	.195
	Married	1.67 $\pm$ .50		
Department	General ward	1.73 $\pm$ .48	2.174	.093
	Outpatient	1.94 $\pm$ .53		
	Intensive care unit	2.06 $\pm$ .15		
	The others	1.64 $\pm$ .53		
Income (per month)	< 2 million won	1.59 $\pm$ .52	2.299	.079
	2 ~ 2.5 million won	1.82 $\pm$ .58		
	2.5 ~ 3.5 million won	1.65 $\pm$ .46		
	> 3.5 million won	1.45 $\pm$ .34		
Religion	Christianity	1.68 $\pm$ .56	.643	.588
	Catholic	1.83 $\pm$ .46		
	Buddhism	1.90 $\pm$ .68		
	None	1.72 $\pm$ .51		
Alcohol drink	Nearly not	1.72 $\pm$ .64	.462	.764
	< Once per week	1.72 $\pm$ .53		
	Once per week	1.78 $\pm$ .47		
	2~3 times per week	1.84 $\pm$ .46		
	$\geq$ 4 times per week	1.55 $\pm$ .46		

### D. Correlation Among Main Variables

The correlations among the main variables are shown in Table 3. There was a statistically significant positive correlation between depression and violence from customers ( $r=.45$ ,  $p<.001$ ), and violence from coworkers and supervisors ( $r=.38$ ,  $p<.001$ ). There were negative correlations among depression and guidelines and policies regarding violence ( $r=-.21$ ,  $p<.001$ ), protective and therapeutic support ( $r=-.25$ ,  $p<.001$ ), and peer support ( $r=-.36$ ,  $p<.001$ ).

Table 4: Correlation Among Main Variables

	1	2	3	4	5	6
1	1					
2	.45***	1				
3	.38***	.47***	1			
4	-.21***	-.22***	-.12	1		
5	-.25***	-.21***	-.18*	.69***	1	
6	-.36***	-.21***	-.21***	.18*	.32***	1

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

1: depression, 2: violence from customers, 3: violence from coworkers, supervisors,

4: guideline & policy for violence, 5: protective and therapeutic support, 6: peer support

**E. Factors Influencing Depression**

Multiple regression analysis was conducted to examine the effects of the various risk factors on depression. Violence from customers ( $t=4.063, p<.001$ ), peer support ( $t=-3.400, p<.001$ ), and violence from coworkers or supervisors ( $t=2.114, p<.05$ ) were found to be significantly associated with depression. These variables explained 33.3% of the depression among clinical nurses <Table 5>.

Table 5: Factors Influencing Depression

Variables	B	SE	Beta	t	P
Age	.128	.082	.161	1.561	.120
Educational Background	-.049	.069	-.047	-.706	.481
Marital status	-.136	.103	-.120	-1.313	.191
Income	-.086	.062	-.104	-1.371	.172
Violence from clients	.381	.094	.318	4.063	.000
Violence from coworkers or supervisors	.253	.119	.162	2.114	.036
Guideline & policy for violence	-.024	.068	-.033	-.358	.721
Protective and therapeutic support	-.031	.075	-.042	-.418	.676
Peer Support	-.208	.061	-.249	-3.400	.000
F = 8.529***adj.R <sup>2</sup> = .333					

\*\*\*.  $p < .001$

**IV. DISCUSSION**

The present study was designed to determine the factors that influence depression among clinical nurses in order to identify ways to improve nurses' mental health. The results show that violence from customers, violence from coworkers or supervisors, and peer support influence levels of depression.

In multiple regression analysis, violence from customers ( $t=4.063, p<.001$ ), peer support ( $t=-3.400, p<.001$ ) and violence from coworkers or supervisors ( $t=2.114, p<.05$ ) were found to be factors that significantly influenced depression among clinical nurses. This result is partially consistent with those of previous studies 22, 24. Furthermore, the current study showed that peer support lowered the average level of depression. Therefore, this study suggests the necessity for effective workplace policies regarding violence to reduce the risk of depression among clinical nurses.

Recently, workplace violence has become an important issue in Korea. A study on nurses revealed that 71% of respondents had experienced workplace violence during the past year 25.

Exposure to violence, such as insults, threats, physical aggression, and witnessing violent acts was strongly associated with depressive symptoms and an increased incidence of major depression 24. Another study reported that experience with verbal or physical violence over the past year increased the risk of depression 26. Nurses who experience violence suffer psychological problems, such as loss of sleep, nightmares, and flashbacks, as well as short-and long-term emotional issues, including anger, sadness, frustration, apathy, and a sense of helplessness. Therefore, exposure to violence may lead to a decrease in productivity in the workplace 27, 28. In other words, work-related depression leads to negative consequences, such as absenteeism and an increased turnover rate. Therefore, in order to decrease the level of depression among clinical nurses, it is necessary to establish effective policies for violence prevention.

Peer support encompasses face-to-face relationships and is likely to be important for the prevention of depression<sup>29</sup>. The present study showed that peer support negatively influenced depression, which is in agreement with the results of previous studies<sup>30-31</sup>. A previous study showed a significant relationship between peer support and depressive symptoms,<sup>30</sup> and when peer support was offered online, it reduced depressive symptoms.<sup>31</sup> Also, online peer support has the potential to be of benefit to young people, specifically students experiencing depressive symptoms<sup>32</sup>.

Even nursing students as well as clinical nurses experienced violence during clinical practice<sup>33</sup>. They may have a negative image on the occupational view for nurse<sup>33</sup>. Kang and Choi<sup>34</sup> suggested necessity of effective support system from psychological and emotional pain for nurses who experienced violence.

The present study suggests that hospital administrators should assess depressive symptoms among clinical nurses. Also, efforts should be taken to monitor workplace violence that take into account important factors influencing depression, and preventive policies for workplace violence should be put into place.

## V. CONCLUSION

The purpose of this study was to investigate the factors that influence depression among clinical nurses in Korea. The subjects of this study were clinical nurses working in 2 general hospitals, and the survey was conducted in 2015. Questionnaires were collected from 190 respondents, and 186 of them were analyzed, excluding 4 with incomplete answers. The average level of depression among the clinical nurses was  $1.74 \pm 0.55$  points, the average level of peer support reported by clinical nurses was  $3.64 \pm 0.65$  points, and the average level of violence from customers, violence from coworkers or supervisors, guidelines and policies regarding violence, protective policies, and therapeutic support were, respectively,  $1.58 \pm 0.48$  points,  $1.19 \pm 0.36$  points,  $1.74 \pm 0.76$  points, and  $2.39 \pm 0.74$  points. In a multiple regression model used to predict depression, violence from customers ( $t=4.063$ ,  $p<.001$ ) violence from coworkers or supervisors ( $t=2.114$ ,  $p<.05$ ), and peer support ( $t=-3.400$ ,  $p<.001$ ) were found to be significantly associated with depression. Based on the findings of this study, hospital administrators should assess depressive symptoms among clinical nurses. Also, steps should be taken to monitor workplace violence that take into account important factors that influence depression, and preventive policies against workplace violence should be developed. Moreover, to lower the levels of depression, clinical nurses need to be examined and effective interventions must be developed, such as peer support programs.

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## The Effect of Men's Gift Giving Behavior in Romantic Relationship

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### Abstract---

**Background/Objectives:** This study attempts to examine effects of changes in romantic relationship context on men's behavior feature and motivation of gift giving behavior.

**Methods/Statistical Analysis:** This study provided the theoretical basis through review of previous studies and set up a research issue a basis. In through qualitative interviews to examined the change of male's gift giving behavior. Through qualitative interviewing methods interviewed a total of 14 interviewees was an analysis was based on it.

**Findings:** The courtship phases have been made non-material gift giving for obtaining the favor. The stage starts in earnest love and fellowship was to constantly express caring or love (affection) for the partner through and non-material gift giving gift giving as well as material in order to maintain this relationship. The monetary cost and time to invest in the present, efforts were highest. Finally, in phase of conflicts, material and immaterial gift giving are both very rare.

**Improvements/Applications:** This study provided the gift giving behavior in terms of male mating strategy, provided marketing strategy theories on the basis of gift-giving behavior in romantic relationship phases.

**Keywords---** Man's Gift Giving, Romantic Context, Gift Giving Behavior, Mating Strategy, Material and Immaterial Gift Giving.

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## I. INTRODUCTION

Gift giving in romantic relationships are common behaviors that frequently occur in everyday life are causing enormous economic consequences caused. Many researchers conducted a study on gift giving behavior because economic effects of gifts to give. However, there is a tendency to overlook the many studies that can give gifts vary according to changes in a romantic relationship<sup>1</sup>. In this study, we conducted a study of the motives on men's gift giving change in accordance with the stages of romantic relationships and their characteristics, gift giving.

## II. LITERATURE REVIEW

### A. *The Concept of Gift Giving and FEATURES*

The concept of gift giving is a representation of the product or service is to provide the (time of the person giving the gift, and activities, including the idea) on a voluntary basis to another person or group<sup>1</sup>, Love and friendship, gratitude<sup>2</sup> or a form of benefits that are granted to the person giving the gift recipient a gift<sup>3</sup>. Gifts can be said that the reason is that any act of a material or non-material gift gifts to the opponent. Types of The gift includes even purchase goods or services, the time of the person giving the gift, activities, ideas, experiences, personally made goods, products or organs were people giving gifts already retained or blood<sup>3</sup>. However, research on many previous studies were non-material gift giving by conducting research focusing on the materialistic gift giving is lacking.

Therefore, the present study is to present the material as well as the type of gift also includes non-material gifts.

### B. *Factors Influencing the Gift Giving*

Gift factors influencing the cycle are factors such as the status and social norms that motivation, a gift of significant relationships of the recipient people and the gift of giving gifts, for receiving gifts, gift giving<sup>3, 4, 12</sup>. These factors may feel significant anxiety or pain affects it as well as feel the gift giving to the recipient and the person giving the gift of joy or happiness to the people to give gifts give gift<sup>5, 11</sup>.

In addition, there may occur out of the present cycle is the relationship. The relationship between the recipient and the gift giver is an important factor in the impact of the present study period<sup>6, 11</sup>. Another recipient of the relationship between people and the gift of giving gifts is the recipient of the gift of motivation and gifts can have a powerful impact on interpreting the meaning of the gift<sup>2,3, 7</sup>.

### C. *Motivation of Gift Giving in Romantic Relationships*

Can be described in a romantic relationship between two motives for men gift giving remains the development and relations of relations in the stage of courtship to seduction or relative to a date, the gift giving as motives for obtaining a relative of love and in the maintenance phase of the relationship it was to appear as a parting gift to avoid or to apologize for the mistake<sup>8, 9, 10</sup>.

### D. *According to the Present Cycle Stages of a Romantic Relationship*

In romantic relationships tend to be male cares for the beauty of women and sexual attributes provide financial resources to women. The men are said to express a desire for a permanent relationship through gift giving.

As such it may vary due to such romantic relationship gift giving, gift giving, especially in men (after an initial relationship and the relationship developed) changes in the flow of time, or relationship reasons. However, many previous studies that stage of the relationship that forms between the two men or perceived throughout the romantic relationship can be changed and these changes are overlooked that could have a significant impact on gift giving.

In this paper, we study the changes in men's gift giving in accordance with the stages of change in romantic relationships, particularly romantic relationship.

### III. PROPOSED WORK

#### A. Test Method

This study provided the theoretical basis through review of previous studies and set up a research issue on a basis. In through qualitative interviews to examined the change of male's gift giving behavior.

This study through a qualitative interview study on how to proceed with the changes in men's gift giving in accordance with the stages of romantic relationships.

Qualitative interview method is dialogue and discussion through the interaction of the central topics in the form of the material and create a new phenomenon has been known for depicting the concept formulation through qualitative interviews. Therefore, it is possible to change as appropriate in understanding the method of the present cycle in accordance with the phase of the male romantic relationships. Through qualitative interviewing methods interviewed a total of 14 interviewees was an analysis was based on it.

In this study identify the stages of a romantic relationship on the basis of previous research into courtship phase, formal love phase, conflict developmental stages. Accurately describe the concept of a romantic relationship, which was for respondents to understand. And the respondents were asked about the gift giving experience and emotion in a romantic stage.

Interviews were conducted before the interview design. The respondents were first question in a case where the target after a crush, first love, in love many times, we continue to question the target of meeting the oldest dating until now.

The best was conducted in-depth interviews aimed at meeting long romance that lasts and lasts, or who was asked about the content and the overall experience and received gifts for dating.

Table 1: Interview Questions

Research Objectives	Interview questions
1. Features of the stage separated from the romantic relationship of a romantic relationship	- A description of each step - Can you tell the whole story about this period? - Is there a way you have or exert oneself to the utmost to express crush your opponent?
2. Features of material gift giving in accordance with the stages of romantic relationships	- What did you present it?
3. Features of non-material gift giving in accordance with the stages of romantic relationships	- Dedication and attention to the opponent Did What?
4. Motivation of gift giving in accordance with the stages of romantic relationships	- Why did you present it?

### IV. CONCLUSION

#### A. Results

The results of this study present cycle 'crush expressed strategy is to buy the favor of a relative in the courtship phase will be the most important feature. In particular, showed that courtship stage consisting of a non-material gift giving more material and more frequently to express crush.

Earnest in the love stage affection strengthening strategy is the most important feature in earnest romance steps to start the fellowship and caring or love (affection) for constantly opponents through the non-material gift giving not only material gift giving in order to maintain this relationship I want to express. The monetary cost and time to invest in the present, efforts were highest.

The conflict was characterized by developmental stage departure prevention strategy or minimizes investment strategy depending on the presence or absence of intention to men wants to maintain the relationship. Conflict occurs when the step is a conflict occurs between two people and feelings between two people because of this. The man is a gift to give to minimize these conflicts and maintain a relationship which was prevented or delayed by the departure by expressing care or affection (affection) and. However, most respondents appeared to give the gift to stop the material and non-material gift giving to the conflict or developmental stage investments with minimal financial cost, time and effort.

The results of the research can be summarized a s follows.

First, in courtship phase, immaterial gift giving was more active compared to the material gift giving. In courtship phase, for those women who have got their good impression, men would prepare what women needs, sacrifice their own goals, carefully listen to women's questions, and help women. These behaviors are immaterial gift giving.

Second, in formal love phase, material and immaterial gift giving are equally frequent, In romantic relationship, investment such as financial expenses, time and efforts are the most frequent.

Third, in the phase of conflicts, material and immaterial gift giving are both very rare.

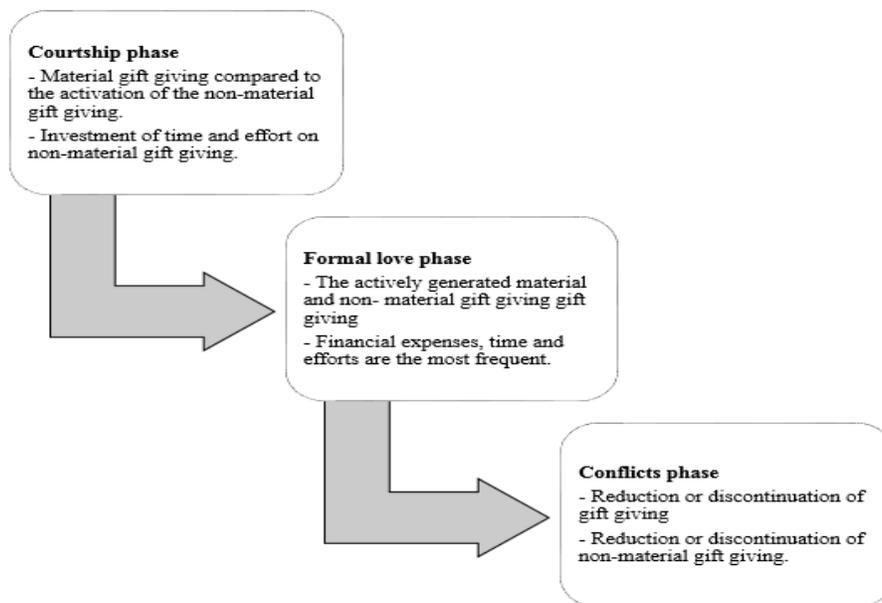


Figure 1: Men's Gift Giving

## B. Discussion

The courtship phases have been made non-material gift giving for obtaining the favor. The stage starts in earnest love and fellowship was to constantly express caring or love (affection) for the partner through and non-material gift giving gift giving as well as material in order to maintain this relationship. The monetary cost and time to invest in the present, efforts were highest. Finally, in phase of conflicts, material and immaterial gift giving are both very rare. This study provided the gift giving behavior in terms of male mating strategy, provided marketing strategy theories on the basis of gift-giving behavior in romantic relationship phases.

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## Study on the Advertisement Strategies for Empowering the Brand of Taekwondowon

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### Abstract---

**Objectives:** The objective of this study is to derive the basic direction of advertisement from fundamental investigation and environmental analysis of Taekwondo Park and provide preliminary data to establish phased advertisement implementation proceeding program of Taekwondo Park.

**Methods/Statistical Analysis:** Survey has been conducted on Taekwondo trainees in foreign countries as a primary user group of Taekwondo Park. Tendency of Taekwondo trainees in foreign countries has been analyzed and utilized as preliminary resources for advertisement program.

**Findings:** It is required to establish systematic advertisement strategies for Taekwondo trainees according to preliminary investigation and environment analysis. It is anticipated to create an attraction of international cultural tourism and also new national image as a hub of cultural and art industry of Taekwondo and also as an opportunity for Taekwondo trainees to exchange with each other.

**Improvements/Applications:** It could have the perspective on advertisement through the analysis of potential visitors.

**Keywords---** Empowering the Brand, Advertisement Strategies, Taekwondowon, Brand Index, Brand Value.

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## I. INTRODUCTION

Taekwondowon is in need of advertisement strategies for successful operation. The objective of this study is to derive the basic direction of advertisement from fundamental investigation and environmental analysis of Taekwondo Park and provide preliminary data to establish phased advertisement implementation proceeding program of Taekwondo Park. First of all, it is to analyze cases of advertisement for similar and competing facilities in Korea and abroad and environment of tourism related to Taekwondo. Secondly, it is to investigate cases of advertisement for major events in Korea and abroad and analyze results of proceeding for the past five years. Third, it is to identify the tendency of potential visitors at Taekwondo Park through an interview with experts and analysis of related data and to analyze the basic direction for establishing advertisement plans.

Preliminary investigation has been conducted through literature review on researches including the fundamental and spatial plans for establishing Taekwondo Park and literature related to Taekwondo in Korea and abroad and utilized as basic data for forming the advertisement strategies for Taekwondo Park through literature review on resources from related organizations.

Survey has been conducted on Taekwondo trainees in foreign countries as a primary user group of Taekwondo Park. Tendency of Taekwondo trainees in foreign countries has been analyzed and utilized as preliminary resources for advertisement program.

## II. MATERIALS AND METHODS

The origin of Taekwondo is Korean traditional martial art in the long history of Korea after Dangun. Taekwondo was selected as a demonstration sport in Olympic in 1988 after the Korea Taekwondo Association was founded in 1961 and also as an official event in Sydney Olympic in 2000. Afterwards, Taekwondo has been growing as a global sport for the past forty years. 206 countries in all over the world are currently of a member of Taekwondo, and the total number of trainees is assumed to be 80 million. There are about a hundred thousand Taekwondo training institutions in all over the world, and Taekwondo is in a position for obtaining fame as a martial art and sport in international society as one of the ten top cultural brands.<sup>1</sup>

However, Taekwondo is an internationally permanent event in Olympic but is facing risk due to insistence from China for how Taekwondo was originated by them, fierce competition with martial arts in various countries, and expansion of Taekwondo influential power from foreign countries in the international arena.<sup>2</sup> Furthermore, there is a difficulty in expanding the base of Taekwondo population due to decreased public interest in Taekwond, slump of Taekwondo in Korea, distribution of Taekwondo based on economy, and decline in interest of Taekwondo economy in the domestic level. Hereupon, the necessity of preparing for strategies that Taekwondo trainees in all over the world are able to participate in by creating the hub of Taekwondo in the world and immediately establishing the education and training facilities of Taekwondo in the country where Taekwondo was originated from along with improvement of international image through Taekwondo. Taekwondowon was opened in 2014<sup>3</sup>

Step 1: Analysis of tour environment related to Taekwondo (Tour products related to Taekwondo)

There has been poor development of tour items for Taekwondo in the past.<sup>4</sup> There are products of Taekwondo tourism for those who visited Korea to experience Taekwondo.<sup>5</sup> However, they were investigated not to be constant and huge in scale with items.

Most of the tourists recruited by one travel agency on an annual basis were between 100 and 200.

Therefore, it was identified that they were very small-scaled compared to other tour products, and there were fewer number of travel agency in dealing with Taekwondo tourism products in small scale as shown in table 1.

Table 1: Analysis on Travel Agencies Investigated in the 'Study for Basic Plans for Establishing Taekwondo Park and Establishment of Spatial plans,' Ministry of Culture and Tourism (2006)

Classification	More than 500	201~500	101~200	Less than 100
Number of travel agency	3	3	4	5
Name of travel agency	- Four SeasonsTour(LA) - Aju Tour(LA), etc.	- Joun Tour(LA) - Walkerhill Travel(NY), etc.	- Global Village Tour(LA) -Ben-Hur Taekwondo	- Info Tour -Korean World Tour, etc.

As for reasons of how Taekwondo tourism products were not promoted, first of all, it is difficult to constantly provide items since Taekwondo-related products are sporadically made by an individual order from one particular training institution.

Secondly, there is no area with high value as a tourism product or symbol such as Taekwondo Park to be established in the future. In addition, there is a high chance for tourist attraction to be determined according to the preference on individual training institutions.<sup>6 7</sup> Therefore, it is difficult to develop large-scaled tourism products. It was feasible to draw an implication that the development of advertisement program was required to promote tourism with Taekwondo. Establishment of Taekwondo Park indicates that infrastructure of Taekwondo-related tourism products is created. Therefore, it will be of motivation for Taekwondo tourism products to be promoted in the future.

Step 2: Taekwondo Festival

Local festival related to Taekwondo has recently been rapidly increasing. In reality, festival has been held mostly by Taekwondo trainees that ordinary citizens were limited to participate in it.<sup>8</sup> Most of the competitions represent a higher proportion of participation from those in Korea compared to entire participating countries.<sup>9</sup>

Therefore, 'International Martial Art Festival in Chung-ju' and 'World Taekwondo Culture Expo' were regarded as a festival that was internationalized and proceeded with cultural commercialism among all other Taekwondo-related festivals as shown in table 2.

Table 2: Festival Related to Taekwondo and Current Status of Competition in KOREA

Name of competition	Taekwondo Hanmadang	International Martial Art Festival in Chungju	Hwarang Taekwondo cultural festival	National outstanding training institution competition	Pumsae competition by the committee chair
Hosted/ sponsored by	Kukkiwon	City of Chungju	Jincheon-gun	Korea Taekwondo Association	Korea Taekwondo Association
Image					
Starting year	1992	1998	2002	2004	2004
Participants (ea)	1400	1000	500	960	1040

Among the festivals related to Taekwondo in Korea, there is a need to promote the biggest scale event named [World Taekwondo Culture Expo] with other famous festivals in Korea in the same level. It is required to develop the international festival with 'Taekwondo,' an item for representing Korea such as Edinburgh Festival in the UK or Avignon Festival in France and also to prepare for systematic program in advertising this at the same time.<sup>10</sup> Instead of merely and directly advertising 'Taekwondo Park,' indirect advertisement of Taekwondo Park from publicity of festivals held in Taekwondo Park might be more effective. In addition, it is needed to expand the natural participation among the public through on/offline events and advertisement programs on the contents of festivals and events. It is also required to connect such festivals with

'industrialization of Taekwondo.' In order for the economic ripple effect of well-known local festivals to be maximized, they need to be developed as related cultural contents and products.

Step 3:Environment Analysis in Taekwondo Market

Starting from 'Hoki' Taekwondo in Korea in the 1980s, corporation-type franchise has been developed while attracting the investment. Hereupon, Taekwondo institutions are becoming corporations.

However, many of the franchises tended to lose their influential power due to influence of deteriorated profitability including IMF afterwards that most of them are currently operated in the membership-only institution.

There are about four Taekwondo franchises that operate more than 100 member institutions in Korea. Other than them, coalitions of membership-only training institutions in each school or area including Yongin University, Yonsei University, and Kyunghee University are being similarly managed.

Step 4: Environment Analysis on Manufacturing and Distributing Companies for Parts and Products

As shown in table 3, Taekwondo item market is divided into 'part market for the competition' and 'item market for the regular training institution.' As for part market for the competition, large sport manufacturer is serving as a major player in the market. However, those who purchase such products are mostly associates in the related business in specialty.

Therefore, the size of market is not large. Item market for regular training institution is in a large scale. Low-price market has already been established due to the trend of preference on low-priced items among Taekwondo training institutions. In addition, related cultural products have not been much developed except for Taekwondo uniforms or items for winners or losers.

Table 3: Taekwondo Products

Taekwondo products	Image		
Part market for the competition			
	Taekwondo uniform	Safety hat	Summer uniform
Item market for the regular training institution			
	Flyers	Medals	Trophies

Step 5: Analysis and Investigation on Potential Visitors in Taekwondo Park (Taekwondo demonstration survey in foreign countries)

This investigation has been conducted to identify the awareness on Taekwondo Park among consumers in foreign countries as a preliminary visitor in Taekwondo Park and preference of program of them in the future and to utilize them for establishment of advertisement program.

Targets for investigation	Taekwondo instructors in America as of August 27th, 2008
Area for investigation	America
Investigation method	Telephone interview investigation in the local area in the use of structured survey copies
Investigation period	August 27th to September 7th, 2007
Significance level	Significance level of 95% ( $\pm 3.0\%$ of maximum allowed error)
Valid sample	Collected copies from 18 participants (distributed copies to 30 participants)

Step 6:Results of Investigation and Analysis on Potential Visitors in Taekwondo Park

Step 6-1Awareness of Taekwondo instructors in foreign countries on Taekwondo Park

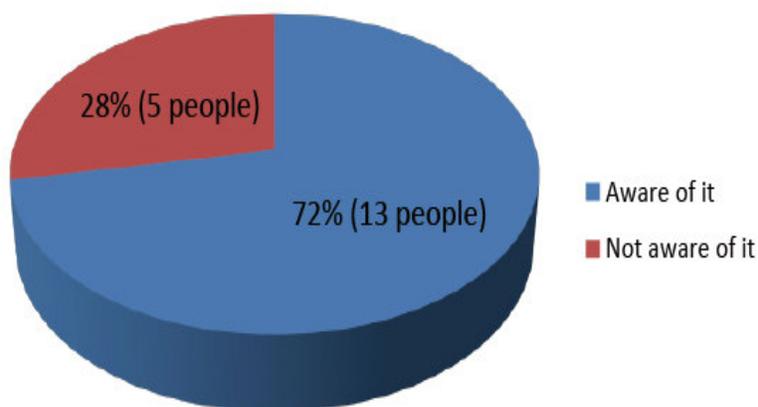


Figure 1

72% of Taekwondo instructors from foreign countries were aware of how Taekwondo Park was to be established in Muju-gun as shown in figure 1. Therefore, it represents high awareness.

Step 6-2 Routes of recognition for Taekwondo Park among Taekwondo instructors in foreign countries

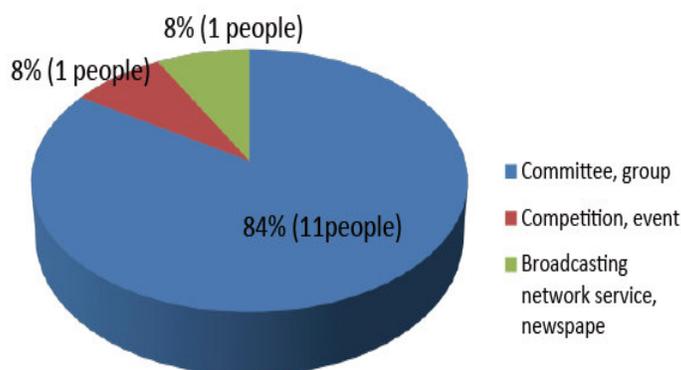


Figure 2

Taekwondo instructors in foreign countries ended up knowing that Taekwondo Park was to be established. Therefore, it turned out that there was a high word of mouth effect as shown in figure 2. However, there was low effect from broadcasting service, newspaper, and magazine.

Step 6-3 Experience of Taekwondo instructors in foreign countries in visiting Korea for Taekwondo events

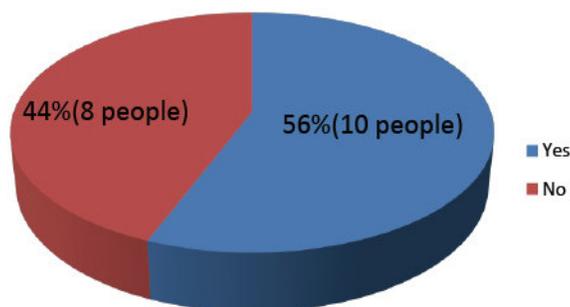


Figure 3

56% of them turned out to visit Korea for events related to Taekwondo including friendly exchange or Taekwondo competition as shown in figure 3.

Step 6-4 The most preferred program among functions of Taekwondo Park

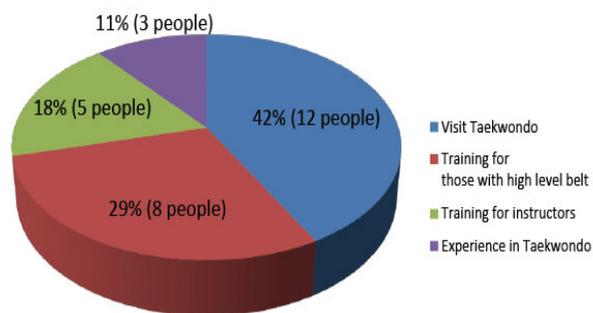


Figure 4

Viewing Taekwondo Park and experience of Taekwondo turned out to be the most preferred among programs in Taekwondo Parkas shown in figure 4. Training of instructors was important, but tour program turned out to be more preferred.

Step 6-5 Period of visiting Taekwondo Park

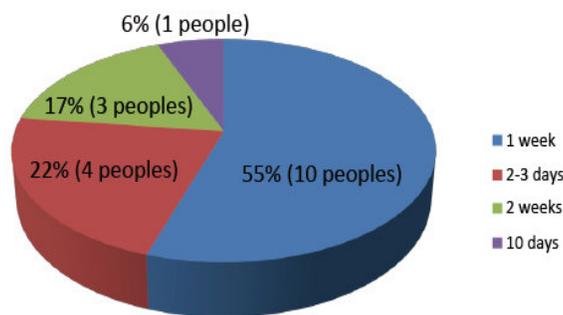


Figure 5

78% of them wanted to visit Taekwondo Park for 1 to 2 weeks as shown in figure 5.

Step 6-6 Period of visiting Taekwondo Park

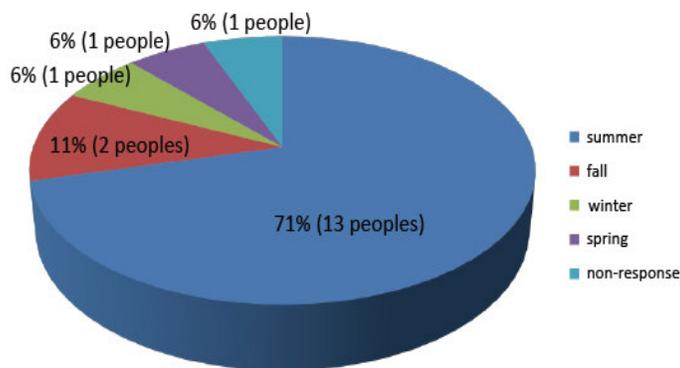


Figure 6

71% of Taekwondo instructors in foreign countries turned out to wish visiting Taekwondo Park in summer as shown in figure 6.

### Step 6-7 Opinion about exhibition contents in Taekwondo Park

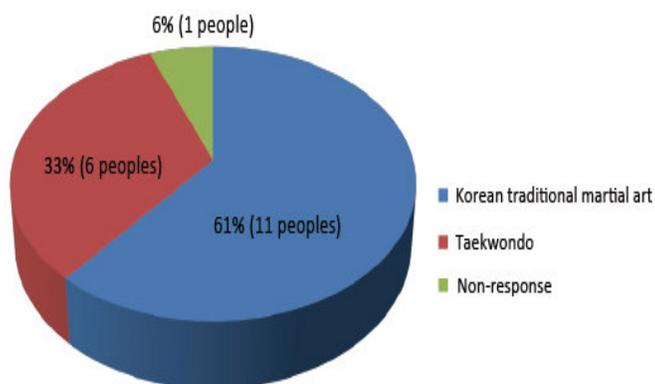


Figure 7

As for exhibitions to view at Taekwondo Park, they turned out to prefer the overview of Korean traditional martial art (61%) the most as shown in figure 7.

### Step 6-8 Products preferred to purchase in Taekwondo Park

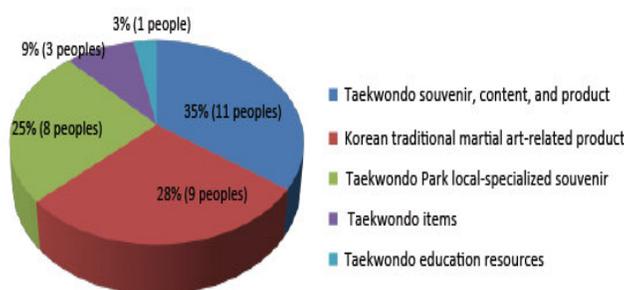


Figure 8

Taekwondo content products turned out to be the highest as 35% among the items that they preferred to purchase at Taekwondo Park, and Taekwondo education resources turned out to be 25%. Regular Taekwondo products turned out to be the lowest as 9% as shown in figure 8. Therefore, it is important to develop Taekwondo-related content product development.

### III. CONCLUSION

Taekwondo Park has established environment that sufficiently fulfills demand from training institutions in foreign countries for tourism in Korea as well as from those in Korea including summer and winter camp. Implications are as follows in the perspective of advertisement from the analysis on potential visitors.

First of all, the first target group for advertisement is Taekwondo trainees in Korea and abroad who are about to freely visit Taekwondo Park in Korea. Secondly, demand of visiting among Taekwondo trainees suggested in previous studies including passing for belt-test or education for belt holders is not much important in the perspective of advertisement as it is related to those visiting Taekwondo Park due to work without entailing the marketing or particular advertisement. Third, visit from the public is related to demand derived from previous tourists in Jeollabuk-do and Muju-gun and hence is a class applied with general advertisement means for improving the brand awareness among the public or in connection with advertisement for existing areas. Fourth, Taekwondo trainees who freely visit Taekwondo Park are those in demand in a close relationship with Taekwondo Park. They have actively appealed the intent of visiting the area according to the survey investigation. Therefore, they are the preliminary target group to be attracted for visiting Taekwondo Park through focused advertisement.

It is required to establish systematic advertisement strategies for Taekwondo trainees according to preliminary investigation and environment analysis. It is anticipated to create an attraction of international cultural tourism and also new national image as a hub of cultural and art industry of Taekwondo and also as an opportunity for Taekwondo trainees to exchange with each other.

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## A Study on the Relative Importance of Early Childhood Education Policy Assessment Scale based on AHP Method

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### Abstract---

**Background/Objectives:** The findings of the study on the relative importance of the early childhood policy assessment scale are expected to boost the utilization and practicality of the scale, to give some suggestions on how to expedite the development of early childhood education policy and finally to provide significant information on the academic development of this field.

**Methods/Statistical Analysis:** AHP method was conducted to check the certainty of the early childhood education policy assessment criteria. The 32 panel members who participated in the Delphi survey were asked to analyze weight by using AHP method.

**Findings:** Then the simple weight of the assessment categories, assessment criteria and assessment indexes was converted into percentage. As for the assessment categories, early childhood education policy publicness was given the most weight(34.2%), followed by policy suitability(31.7%), policy democracy(23.1%) and policy economic efficiency(11.0%). Afterwards, the simple weight of the assessment criteria and assessment indexes was respectively calculated within the superordinate dimensions, namely the assessment categories to which each of them belonged. As a result of analyzing the total weight of the assessment criteria and assessment indexes, public benefit(.150) was found to be top priority for the assessment criteria, followed by feasibility(.118), accountability(.102) and sufficiency(.090). As for the assessment indexes, top priority was given to the level of donation to the interests of preschoolers(.063), followed by the level of fulfilling social obligation(.056) and the level of long-term benefit(.053).

**Improvements/Applications:** In this study, the weights of the early childhood education assessment scale were estimated by a panel of experts who used the AHP. How much the responses of the experts were consistent was analyzed before their estimation of the weights, and then the simple weights and total weights of the assessment categories, criteria and indicators were calculated.

**Keywords---** Early Childhood Education, Policy, Assessment Scale, AHP Method, Relative Importance.

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## I. INTRODUCTION

In order to accelerate the alteration of early childhood education, the betterment of educational situations including policy setting, facilities and finance is demanded, and a lot of exertions should be made to improve curriculums and the dependability of early childhood education at the same time. As the weight of early childhood education is increasingly recognized, not only the early childhood education community but the government and politicians have suggested a variety of educational policies and alternatives. In fact, however, the government takes a look at the weight of early childhood education from the perspectives of social welfare and demography rather than from the perspective of education<sup>1</sup>.

Meanwhile, there have been dynamic shifts in policies related to early childhood education such as extended free education, more assistance for private kindergartens, better teacher treatment, improved kindergarten environments and increasing all-day classes.

Nonetheless, not many efforts have ever tried to examine national policies that are applied to the field of early childhood education<sup>2</sup>. Whether there is anything wrong with early childhood education policies isn't yet properly considered, and policy assessment isn't on the right track, either, though policy assessment is also important.

Level 1	A hierarchical mechanism of the problem
	↓
Level 2	Pair-wise comparison matrix to construct
	↓
Level 3	Consistency ratio verification
	↓
Level 4	Calculating relative weights
	↓
Level 5	Priority of comprehensive ranking results

Figure 1: Perform the Procedure of AHP Method

The theoretical foundation built by existing studies, practical methodology acknowledged by experienced educators and researchers, and universal social values should all be reflected when an early childhood education policy is formulated and when the scope of it is determined. Also, the government, research institutions, scholars, the National Assembly, political parties, mass communication and people including parents should all be directly or indirectly involved in policy setting process by giving their opinions.

The purpose of this study<sup>3</sup> was to examine Kim's Early Childhood Education Policy Assessment Scale by applying the analytic hierarchy process method(AHP method) in an effort to decide the relative weight of the scale. The analytic hierarchy process could be said as a decision-making method of problem-solving type that properly combines subjective judgments and system approaches for the purpose of problem analysis. That makes it possible to analyze and evaluate a problem in a hierarchical way when the problem isn't clear enough, and to judge qualitative characteristics by quantitative standards<sup>4</sup>. That is, this method enables researchers to quantify and estimate the priority for the problem by converting a rating scale into a ratio scale<sup>5</sup>. Furthermore, that makes it possible to make a more coherent and objective judgment by reflecting the knowledge, experience and intuition of a panel of experts<sup>4</sup>. This method has widely been applied in studies that need decision making thanks to its characteristics involving theoretical simplicity and clarity, ease of use and the generality of subjects<sup>6</sup>.

The findings of the study on the relative importance of the early childhood policy assessment scale are expected to boost the utilization and practicality of the scale, to give some suggestions on how to expedite the growth of early childhood education policy and finally to supply significant information on the academic growth of this field. A research question was posed: What is the relative importance of the early childhood education assessment scale?

## II. RESEARCH METHOD

AHP method was conducted to check the validity of the early childhood education policy assessment criteria. The 32 panel members who participated in the Delphi survey were asked to analyze weight by using AHP method<sup>7-8</sup>. Stratified analysis using the AHP method proceeds to the process presented in Figure 1.

To apply AHP, Stage 1 needs to 'form problematic hierarchy,' which makes a decision-making hierarchy mechanism map of the analytical subjects by mutually-related decision-making standard.

Stage 2 is to 'form pair-wise comparison matrix.' AHP makes one-to-one relative assessment by having its upper hierarchy as the assessment standard with being made a pair between two items, in order to calculate the weight of factors, which are at the same level.

Stage 3 is to 'verify consistency.' In order for the relative importance to have a reliable significance, the judgement of pair-wise comparison within one hierarchy needs to have consistency<sup>5</sup>. To confirm significant level of a rater's judging the weight, AHP calculates CI(consistency index), CR(consistency ratio) and RI(random index) as follows<sup>9</sup>.

$$CI = (\lambda_{max} - n) / (n - 1)$$

- n: Number of elements, which become the comparative objects within one hierarchy

$$CR = (CI / RI) \times 100$$

Stage 4 is to 'calculate relative weight.' To measure relative weight of decision-making elements, Saaty's<sup>7</sup> eigenvalue method is mainly used. Priority related to matrix is shown by using eigenvector. Given designating the relative weight of n-piece factor within hierarchy as  $w_i (i = 1, \dots, n)$ , the factor of the pair-wise comparison matrix may be estimated to be  $a_{ij} = w_i / w_j (i, j = 1, \dots, n)$ . The following weight is calculated according to eigenvalue method by expressing this as matrix.

$$A \cdot W = \lambda_{max} \cdot W$$

- A: Square matrix that was obtained as a result of the pair-wise comparison

-  $\lambda_{max}$ : A's maximum eigenvalue

- W: Eigenvector of responding to  $\lambda_{max}$

The last stage is to 'synthesize the outcome of priority.' The order of a decision-making alternative is calculated by synthesizing relative weight in order to determine priority on each hierarchy after finishing the verification of consistency and the calculation of relative weight.

## III. RESULT

The Delphi questionnaire for the estimation of the weights of the assessment criteria for early childhood education policy consisted of three hierarchies: four assessment categories, 13 assessment criteria and 44 assessment indicators. Table 1 shows the importance and priority of the assessment categories of the first hierarchy based on their weights estimated by the panel.

Table 1: The Simple Weights of the Assessment Categories

The Assessment Categories	Weight	PCT(%)	Priority
1. Policy publicness	.34	34.2	1
2. Policy democracy	.23	23.1	3
3. Policy adequacy	.32	31.7	2
4. Policy economy	.11	11.0	4
Total weight	1.00	100.0	

As Table 1 shows, then the simple weight of the assessment categories, assessment criteria and assessment indexes was converted into percentage. As for the assessment categories, early childhood education policy publicness was given the most weight(34.2%), followed by policy suitability(31.7%), policy democracy(23.1%) and policy economic efficiency(11.0%). Afterwards, the simple weight of the assessment criteria and assessment indexes was respectively calculated within the superordinate dimensions, namely the assessment categories to which each of them belonged.

The total weights, importance and priority of the assessment criteria and indicators of the assessment scale are shown in Table 2.

Table 2: The Total Weights and Importance of the Assessment Criteria and Assessment Indicators

Assessment Criteria	Total Weight of the Criteria	Assessment Indicators	Simple Weights of the Indicators	Total Weights of the Indicators	Priority
1-1. Policy publicness	.150	1-1-1. How much the policy contributes to the public interests	.227	.034	7
		1-1-2. How much it contributes to the interests of preschoolers	.419	.063	1
		1-1-3. How much it provides benefits on the long-term basis	.353	.053	3
1-2. Policy sufficiency	.090	1-2-1. How much it satisfies the needs of the members in terms of process	.364	.033	8
		1-2-2. How much it satisfies the needs of the members in terms of results	.268	.024	16
		1-2-3. How much it ensures the good performance of early childhood education	.368	.033	8
1-3. Policy accountability	.102	1-3-1. How much it fulfills the social accountability	.550	.056	2
		1-3-2. How much it satisfies the conflicting needs of interest groups	.182	.019	23
		1-3-3. How much it reduces problems that might occur during policy implementation such as cost problems or inconveniences	.268	.027	14
2-1. Policy acceptability	.075	2-1-1. How much it follows the principles that have been laid down based on quality educational experiences	.377	.028	11
		2-1-2. How much it accepts what's suggested by those who assume the obligations	.172	.013	32
		2-1-3. How much it accepts what's suggested by the policy beneficiaries	.196	.015	27
		2-1-4. How many members are received as policy evaluators	.255	.019	23
2-2. Policy autonomy	.067	2-2-1. How much it ensures the autonomy of the members when they give their opinions.	.313	.021	21
		2-2-2. How much it allows the members to control the policy implementation or implement it on their own	.325	.022	19
		2-2-3. How much it is independent from the government or external authority	.363	.024	16
2-3. Policy diversity	.089	2-3-1. How much it satisfies the members who are all different	.321	.028	11
		2-3-2. How much it reflects sociocultural diversity	.316	.028	11
		2-3-3. How much it reflects the various aspects of early childhood education including inclusive education and multicultural education	.363	.032	10
3-1. Policy feasibility	.118	3-1-1. How much it can be entrenched under the current educational circumstances	.359	.042	5

		3-1-2. How much it can be materialized in cooperation with educational institutions	.429	.051	4
		3-1-3-. How much it can be materialized based on early childhood education theories	.212	.025	15
3-2. Policy timeliness	.081	3-2-1. How much the environments are appropriate to implement it	.247	.020	22
		3-2-2. Whether it is the right time for it to be implemented	.288	.023	18
		3-2-3. How much it is consistent with its objectives?	.465	.038	6
3-3. Policy responsiveness	.062	3-3-1. How it responds to social needs	.357	.022	19
		3-3-2. How it copes with class discrimination	.201	.012	35
		3-3-3. How the government copes with it in terms of administration and finance	.240	.015	27
		3-3-4. How it handles what happens during its implementation	.202	.012	35
3-4. Policy locality	.055	3-4-1. How much it reflects regional specificity	.238	.013	32
		3-4-2. How much it is flexibly executed in consideration of the environmental changes of local education	.296	.016	25
		3-4-3. How much it reflects efforts to improve local educational environments.	.201	.011	37
		3-4-4. How much it reflects local needs	.266	.015	27
4-1. Policy rationality	.046	4-1-1. How much it complies with the basic principles of early childhood education in terms of planning and setting	.332	.015	27
		4-1-2. How much it complies with the basic principles of early childhood education in terms of implementation	.352	.016	25
		4-1-3. How much it complies with the government's way of budget execution	.316	.014	31
4-2. Policy effectiveness	.039	4-2-1. How much the results of it are consistent with its objectives	.229	.009	38
		4-2-2. How much it increases the opportunities of early childhood education	.225	.009	38
		4-2-3. How much it contributes to the enhancement of the quality of early childhood education	.329	.013	32
		4-2-4. How much it contributes to the professional development of early childhood teachers	.218	.008	40
4-3. Policy efficiency	.025	4-3-1. How much it is useful in comparison with its execution cost	.204	.005	43
		4-3-2. How much practical benefits the results of it provides to early childhood education	.328	.008	40
		4-3-3. How much it is useful in comparison with various possible side effects	.175	.004	44
		4-3-4. How much positive influence the results of it exert on overall policies	.294	.007	42
	1.000		1.000		

As Table 2 shows, result of analyzing the total weight of the assessment criteria and assessment indexes, public benefit(.150) was found to be top priority for the assessment criteria, followed by feasibility(.118), accountability(.102) and sufficiency(.090). As for the assessment indexes, top priority was given to the level of donation to the interests of preschoolers(.063), followed by the level of fulfilling social obligation(.056) and the level of long-term benefit(.053).

#### IV. CONCLUSION

In this study, the importances of the early childhood education assessment scale were estimated by a panel of experts who used the AHP. How much the responses of the experts were consistent was analyzed before their estimation of the importances, and then the simple weights and total weights of the assessment categories, criteria and indicators were calculated. As for simple weight, "policy publicness" that was one of the assessment categories was highest in that regard. As to total weight, "public interest" was the assessment criteria whose total weight was highest, and "how much the policy contributes to the interests of preschoolers" was the assessment indicator whose total weight was highest. Thus, these assessment category, criteria and indicator were given priority.

The findings of the study illustrated that in terms of early childhood education policy assessment, the kinds of assessment criteria and indicators that belong to the categories of publicness, adequacy and democracy are of importance. Specifically, the finding that the importance of the principle of democracy was stressed is noteworthy in that it is differentiated from the findings of earlier studies<sup>10-11</sup>. It could be interpreted that these areas should carefully be considered when an early childhood education policy is formulated.

So far, a research study was implemented on experts in early childhood policy and assessment, experts in early childhood administration and professional early childhood educators by applying the AHP. This study has a limitation in that it was conducted just in some regions, and the findings might not be generalizable. Yet as this study was conducted on the experts, it might not matter that its geographic scope was limited<sup>12</sup>.

Finally, this study has the following limitations: First, the geographic scope of this study was confined to some regions by examining the early childhood teachers who worked in the city of Busan and South Gyeongsang Province. To manufacture more generalizable results, more sampling is required from ample regions, but it's not possible in this study to do that. Since then, sampling from more widen areas is required<sup>13-14</sup>. Second, a survey was conducted in this study, which is a quantitative research method, but it's not quite possible to look into the awareness and opinions of the early childhood teachers about the research theme in depth. In the future, a qualitative research should be implemented by having an in-depth interview to produce more detailed, precise results.

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## A Study on Designing and M-STEAM Class with Smart Devices for Early Childhood in Korea

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### Abstract---

**Background/Objectives:** Education in the post human era must have creativity with mathematical problem solving, with technological and engineering management based on scientific knowledge, and with artistic sensibility, by guiding students to utilize a major factor of ICT - smart device.

**Methods/Statistical Analysis:** An initial basic direction was set to emphasize the necessity of the M-STEAM class for early childhoods by reviewing preceding research and literature regarding mathematics programs, mathematics activities, Nuri curriculum, and STEAM. And we also defined a list of smart devices and their assessment criteria, and then created a list of smart devices for an early childhood M-STEAM class. Third, we developed the final design of M-STEAM class for early childhood.

**Findings:** First, the design of M-STEAM class for early childhood with smart devices will proceed with an order-partial appreciation and analysis of STEAM, introduction of problematic situations, analysis and understanding of the problems, exploring resolutions, creative design and emotional experiencing, creative convergent design, conclusion on problem solving, smart devices will be used to provide a wealth of information, information and communication technologies, participation and cooperation, sharing, and interactions. Second, contents of proposed M-STEAM class will be based on mathematical contents such as location, direction, basic measurement, and distance. Smart devices will provide LED lighting, motor, camera functions to resolve problematic situations regarding STEAM activities and be used to proceed creative convergent design.

**Improvements/Applications:** The proposed M-STEAM class as a new educational paradigm in the post human era will facilitate the development and distribution of new convergent teaching methods in the early childhood education.

**Keywords---** Class Design, Early Childhood, ICT, M-STEAM, PROGRAM, Smart Device.

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## I. INTRODUCTION

Development of information and communication technologies (ICT) and emergence of smart devices have significantly changed approaching methods and educational environments in compulsory education. It has complemented classic textbooks into digital textbooks, and provided copious learning materials by so called, Apps (applications). A steady increase in social network services (SNS) has implemented an approaching method to freely communicate between a person and groups beyond spatio-temporal barriers. In this rapidly changing post-human era, the utilization of ICT in an educational environment is an emerging new educational approach<sup>1,2</sup>. Education based on ICT employed by the Korean compulsory education system now becomes a trend in early childhood education. Teachers in the early childhood education and administrators in the field<sup>3-6</sup> have concurred to provide children with adequate experiences with computers and smart devices and relevant activities for their development by effectively utilizing ICTs for the 21<sup>st</sup> century's national competitiveness<sup>7</sup>. In addition, The United Nations Educational, Scientific and Cultural Organization<sup>8,9</sup> indicates since children in the modern society have already experienced much in ICTs and ICTs become a vital factor for children development, a new, adequate educational method are imperative. In other words, education in the post human era must have a convergent thinking ability with mathematical and logical problem solving, with technological and engineering management based on scientific knowledge, and with artistic sensibility, by guiding students to utilize a major factor of ICT - smart device. It is the STEAM (Science, Technology, Engineering, Arts, and Mathematics) that has recently been adapted in the Korean educational system<sup>10</sup>.

## II. LITERATURE REVIEW

The STEM education is needed to focus on childhood-the most sensitive stage to develop creative, convergent human resources<sup>11</sup>.

While current early childhood education are based on questioning, exploring, subject-oriented, comprehensive, reality-based, and constructive schooling, which is very similar to the direction of the STEAM education<sup>12</sup>.

The current education lacks creative problem solving with technologies and engineering which is regarded as a main purpose of the STEAM education. Therefore, in this study, we elect smart devices as a teaching medium, which rigorously represent modern technologies and engineering, in order to design the M-STEAM education with smart device for early childhood.

Although so far, there have been preceding studies to pave a way toward the STEAM education for early childhood<sup>13-16</sup>, many studies had focused on developing STEAM educational models and programs typically based on science and arts<sup>11,16</sup> and their corresponding research on class designs were limited to compulsory education<sup>17,18</sup> while studies have lacked in early childhood education. Considering fewer studies have performed in STEAM education emphasizing technologies, engineering, and mathematics than in STEAM education focusing on science and arts<sup>19</sup>, the current education systems have limitations in promoting the convergent ability that integrates technology, engineering, and mathematics together<sup>20,21</sup>. Thus, in this study, we propose to design an M-STEAM education for early childhood with smart devices that exploit representative features of modern technologies and engineering in order to meet the paradigm change in post human era's education.

Through the M-STEAM education with smart devices for early childhood, it will facilitate applications of the STEAM education to early childhood education fields, promote early childhood' problem solving and creativity, and their accessibility to information technologies.

It will enable us to attempt a new educational model as a new paradigm in the post human era. We established the followings as research issues.

- 1) How do we design the M-STEAM class with smart devices for early childhood?
- 2) What will be contents of the M-STEAM class with smart devices for early childhood?

### III. PROPOSED WORK

#### A. Procedures for Designing an M-STEAM Class with Smart Device for Early Childhood

Procedures for designing an M-STEAM class with smart device for early childhood are demonstrated in (Figure 1).

First, an initial basic direction was set to emphasize the necessity of the M-STEAM class for early childhood by reviewing preceding research and literature regarding mathematics programs, mathematics activities, Nuri curriculum, and STEAM.

Based on preceding research, we defined a basic concept of STEAM and a basic direction for early childhood M-STEAM, and sub-factor for an early childhood M-STEAM a class configuration. Second, we also defined a list of smart devices and their assessment criteria, and then created a list of smart devices for an early childhood M-STEAM class.

Third, we developed the final design for an early childhood M-STEAM class.

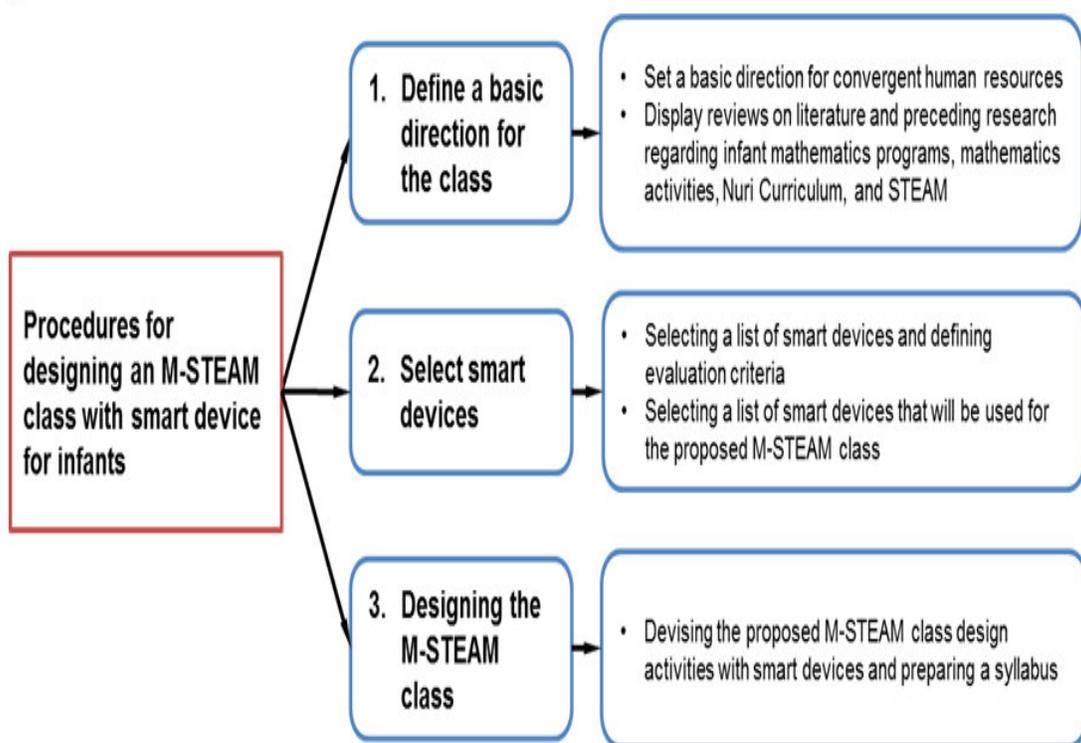


Figure 1: Procedures for Designing an M-STEAM Class with Smart Device for Early Childhood

First, an initial basic direction was set to emphasize the necessity of the M-STEAM class for infants by reviewing preceding research and literature regarding mathematics programs, mathematics activities, Nuri curriculum, and STEAM.

Based on preceding research, we defined a basic concept of STEAM and a basic direction for infant M-STEAM, and sub-factors for an infant M-STEAM a class configuration.

Second, we also defined a list of smart devices and their assessment criteria, and then created a list of smart devices for an infant M-STEAM class. Third, we developed the final design for an infant M-STEAM class.

#### B. Features of Smart Devices Systems used in an M-STEAM Class for Early Childhood

The smart device system employed in this study utilizes the sound, microphone, light-emitting-diode lighting, motor and camera functions, whose contents are listed in as shown in table1.

Table 1: Smart Device System Classification and Contents

Classification		Contents	Classification		Contents
Sound/ Microphone		<ul style="list-style-type: none"> <li>The sound function will be determined whether it will use an exterior module or process internally. Preferably, functions embedded in the processor such as ADC and DAC or sound codes will be used.</li> <li>If an external sound chip is used, we will develop a function to play an WAV, WMA as well as MP3 file based on the VS1003 chip by VLSI. Since former developed technologies already existed, we will reflect this.</li> </ul>	Motor		<ul style="list-style-type: none"> <li>A motor control module that can be integrated in a moving object such as a car.</li> <li>Precise control possible by using a stepping motor.</li> <li>Front / rear / left / right control available.</li> </ul>
Light Emitting Diode (LED)	To be developed	<ul style="list-style-type: none"> <li>LEDs embedded in a semi-transparent tube provide a lighting effect.</li> <li>An LED module whose brightness and color can be controlled by an Android device or iPad/iPhone is embedded.</li> </ul>	Camera		<ul style="list-style-type: none"> <li>In conjunction with smart devices, movie recording and picture taking are available. Once connected with a communication module, it can be controlled and monitored remotely.</li> <li>The camera module has a high resolution (more or equal than 1280x720, high definition). Through this camera module, children can record and verify the interior and exterior of their products.</li> </ul>

**C. A Model of the M-STEAM Class with Smart Devices for early Childhood**

M-STEAM is a convergent education method that expands mathematic factors in infrastructures built by smart devices, to integrate contents of mathematics, science, engineering, technologies, and arts. A design model of the early childhood M-STEAM class with smart devices is demonstrated in (Figure 2)

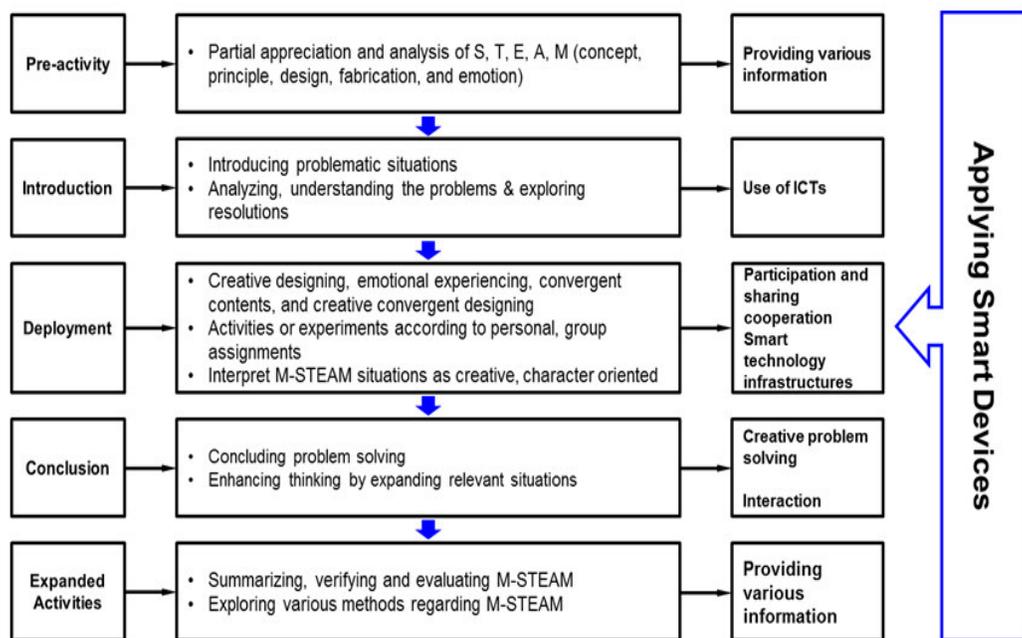


Figure 2: A design model of the M-STEAM class with smart devices for early childhood

**D. Contents of the M-STEAM Class with Smart Devices for Early Childhood**

Contents of the M-STEAM class with smart devices for early childhood such as sound systems, microphones, LED lighting systems, motors, and camera functions and convergent thinking factors are demonstrated shown in table2.

Table 2: Contents of the M-STEAM class and convergent thinking factors for early childhood

Life theme	Activities	Factors for Convergent Thinking	Smart Device Application	Activity Pictures
<b>Title: Our local map of public agencies</b>				
Our Hometown	Searching by locations and directions of public agencies with a map that can be used in day and night. (location and direction)	S: Searching towns on the map (observation, classification), light T: Cartography according to day and night E: Design with light A: Drawing towns M: Counting buildings, location, direction	Designing a map with LED lighting to make it visible at night	
<b>Title : My story of home that I made</b>				
Life tools	A ruler-shaped bug measures and compares objects. (Measurement –basic measurement and measurements on surrounding objects)	S: Various lighting, blending lights T: House Blueprint, 3D representation E: SCAMPER technique (Magnification, reduction, rotation), Shooting a photo of a motor cube A: charming picture books, playing and recording songs. M: Measuring house, window fenestration	 Moving by using the motor and taking a photo of a house Playing and recording children's music	
<b>Title: Interesting Perspective Photos</b>				
Many countries around the world	Taking an interesting perspective photo of famous architectures in many countries around the world. (Distance, direction)	S: Principle of Perspective T: Taking perspective photos E: Utilizing various special lenses A: Appreciating the sophistication and beauty of world architectures M: Comparison of object's size depending on its distance	 Taking perspective photos and utilizing various special lenses	

As the pre-activity for designing a model of the M-STEAM class with smart devices for early childhood, various information by smart device applications to analyze and appreciate the concept, principle, design, fabrication, and emotion for the individual factors of STEAM - S, T, E, A, and M, is provided. In the introduction, a problematic situation will be suggested to analyze, understand, and explore the origin of the problem. Smart devices will be applied to utilize information and communication technologies. In the deployment, participation, cooperation, sharing, and technological infrastructure of smart devices will be made to enable creative designing, emotional experiencing, information fusing, and creative convergent designing. In the conclusion, concluding on problem solving, enhancing thinking ability by expanding relevant situations, creativity, creatively solving problems, and interacting with smart devices will be made. The last expanding class activities will summarize, confirm, and evaluate the M-STEAM class to explore various ways. It will employ smart devices that provide various information.

#### IV. CONCLUSION

It also requires an ability to adequately choose relevant knowledge as well as an innate intellectual ability. Accordingly, ever since 2010, while studies on integrating mathematics, science, arts, and music together have been actively performed, technology and engineering parts in the education have not received much attention. As the early childhood education has emphasized the importance and necessity of STEAM, we aimed to develop M-STEAM class design for early childhood and its corresponding contents with smart devices as a means of a convergent teaching method. It will lead to link between the early childhood education and the elementary education and also contribute to settle a true STEAM class in the early childhood education.

Our conclusion based on the results demonstrated are as follows: First, class design for M-STEAM class with smart devices for early childhood will proceed with an order – partial appreciation and analysis of STEAM, introduction of problematic situations, analysis and understanding of the problems, exploring

resolutions, creative design and emotional experiencing, creative convergent design, conclusion on problem solving, summarizing, verifying and evaluating M-STEAM. Here, smart devices will be used to provide a wealth of information, information and communication technologies, participation and cooperation, sharing, and interactions.

Second, contents of proposed M-STEAM class will be based on mathematical contents such as location, direction, basic measurement, and distance. Smart devices will provide LED lighting, motor, camera functions to resolve problematic situations regarding STEAM activities and be used to proceed creative convergent design.

This study provides academic and educational background materials for the early childhood education by developing the proposed M-STEAM class design. In other words, the proposed M-STEAM class as a new educational paradigm in the post human era will facilitate the development and distribution of new convergent teaching methods in the early childhood education. Specifically, the proposed M-STEAM class will maximize early childhood' self-directed learning, voluntary participation, as well as positive interactions with machine, since early childhood in free activity times on an educational field voluntarily select smart devices, express their own thoughts and opinions, and creatively create their own results. In particular, the contents of the proposed M-STEAM class will facilitate a mood of convergent education by overcoming educational difficulties in a kindergarten which requires educational experts to implement new technologies in convergent educational media. As well as, when a teacher prepares for a class in a kindergarten, he or she can deteriorate from his/her center of activities by actively utilizing smart device teaching media. In this process, we are expecting that it creates a classroom atmosphere with creative thinking capability, and with smart quality. Our proposed class simultaneously satisfies 'STEAM literacy'<sup>14,22</sup>, which has served as a STEAM education purpose in South Korea and provide an adequate STEAM educational model in the fields of the early childhood education. In addition, our proposed education that agrees with Sanders<sup>23</sup>, who claimed an increased value when integrating classes together such as science and arts, will play an important role in the early childhood education since it implements a true STEAM education with smart devices representing technologies and engineering for early childhood.

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## The Comparison of Flipped Learning Effects in Korean School Classes

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### Abstract---

**Background/Objectives:** Since flipped learning was introduced, many researchers have investigated it has improved student recognition and participation. This paper synthesizes the effects of flipped learning on Korean students' achievement.

**Methods/Statistical Analysis:** All related journals and dissertations of Korea were collected from online database with specific keywords: flipped learning, flipped class, flipped classroom, inverted class, inverted classroom, smart learning, and blended learning. Each material was examined how much it represented the effect of new way learning method. The 36 studies were chosen to analyze the improvement of student recognition and participation in class. Comprehensive Meta-Analysis software was used to calculated effect sizes.

**Findings:** The chosen 36 essential studies from 288 impact sizes were analyzed statistically and numerous results found. From the results, 0.54 standard deviation includes the effect size of the affective (0.86), cognitive (0.53), and psychomotor (0.51) represents the flipped learning in Korea is more related to students' affective aspects. For the effect comparing with outcome domains, data formats, publication types, student levels, and subjects, there is improvement in music, social studies, science, English, computing, and Korean from subject criteria. Data format has 3 different categories as pre-post, experimental-controlled, and standardized mean change difference. The difference is not significant. The studies from the United States show very positive results but Korean students' improvement is not numerically large enough, the numeric data is statistically meaningful though. It is important that this is the first trial to analyze the published Korean journals and dissertations of the effect of flipped learning in Korea with meta-analysis method.

**Improvements/Applications:** Due to small sample size, only a few years past after adapting the flipped learning to school in Korea, meta-analysis doesn't show the remarkable improvement of effect of it.

**Keywords---** Flipped Learning, Flipped Classroom, Inverted Class, Effect Size, and Meta-Analysis.

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## I. INTRODUCTION

Flipped learning, synonymous with the flipped classroom, and inverted class, was introduced by two US high school science teachers to help students who could not come to class. Initially, they recorded lectures and provided them to students.

Later, they developed a method that established a new way for the classroom to work. The fundamental idea of flipped learning is to study at home and do the assignments at school. It started in high school chemistry classes and has now been adapted to elementary schools, middle and high schools, and even colleges.

Flipped learning is related to both "Just-in-Time-Teaching" (JiTT)<sup>1</sup> and "Peer Instruction" (PI)<sup>2</sup>. JiTT involves students completing outside-class reading and assignments<sup>3</sup>, the results of which are used by the teacher to influence and inform the direction of subsequent teaching sessions such as lectures<sup>1</sup>. PI implies an in-class method developed to promote student participation and learning in lectures, based on discussions around conceptual questions posed by the teacher<sup>3</sup>.

These two techniques have recently been referred to as inverting or "flipping" the classroom structure: moving content coverage outside the classroom in order to spend valuable in-class time on more difficult tasks<sup>3</sup>. There are positive consequences from even English class with flipped learning<sup>4</sup> and online learning with collaborative e-learning<sup>5</sup>.

South Korea has been one of the top-scoring countries in the Program for International Student Assessment (PISA)<sup>6</sup> and other various international achievement tests, but achievements in the affective domain such as motivation, interest, and self-efficacy have been problematic. Nowadays, traditional lecture-based classes in Korea are changing, emphasizing problem-solving ability, project-based learning, application of learning, peer-to-peer education, and cooperative education rather than competitive education. Flipped learning is becoming a new class paradigm in Korea and many researchers have examined the effects of flipped learning for the various levels of students and schools<sup>7</sup>.

Based on Bates and Galloway, despite the rapid rise in the popularity of flipped learning adaptation and exploration in the past decade, and most of the studies proved that flipped learning was effective, improving students' performance and showing benefits compared with traditional learning<sup>8</sup>. However, some papers have only discussed the pros and cons of the effect of flipped learning on the basis of assessment data of student learning that has utilized this flipped learning approach<sup>9</sup>.

There are relatively few review studies on the overall effect and efficacy of flipped learning for various subjects and student levels<sup>10</sup>.

Dr. Matthew A. Verleger conducts a comprehensive survey of prior and ongoing research on the flipped classroom<sup>11</sup>; however, he neither probes into the effect and efficacy of flipped learning nor provides a thorough review and analysis of studies related to it. Correa suggests that "a meta-analysis which can provide an overall effect of flipped learning is needed and of significance"<sup>10</sup>. The purpose of this study is to verify the effects of flipped learning on student achievement.

In particular, it aims to investigate empirically the effects of flipped learning on student achievement using quantitative data from Korean academic studies. This study sheds light on the effectiveness of flipped learning on students' cognitive and affective achievement by adding Korean evidence to the international knowledge base of this highly adaptable learning and teaching method.

## II. MATERIALS AND METHODS

It shares common characteristics in structure of formulating a problem, collecting, coding, analysis, and interpretation of data, although meta-analysis is not a major research method<sup>11</sup>. This research is a meta-analysis of issued journals and dissertations on flipped learning undertaken in Korea.

### A. Inclusion Criteria and Literature Search

There was no limitation set for the scope of school levels and class subjects. The data used for this meta-analysis were issued through April 2016 and derived from the following keyword searches: flipped learning, flipped class, flipped classroom, inverted class, inverted classroom, smart learning, and blended learning. The inclusion criteria for quantitative outcomes concentrated on either student's knowledge or reasoning

processes. The data must provide enough information to know an effect size. Another consideration is the comparison of flipped learning condition-experimental groups and control condition-traditional class learning groups.

This literature was not incorporated in this analysis although more literature and non-empirical literature reviews were categorized as sources of relevant research<sup>12</sup>. The literature was searched through online databases in Korea such as RISS.kr, NDSL.kr, DBpia.co.kr, and the National Assembly Library of Korea online for empirical papers being commensurate with the inclusion criteria. Eventually, 36 meaningful studies were found.

### B. Coding Studies

All necessary data from published studies were reviewed and coded by categories: flipped learning group and non-flipped learning group, before and after flipped learning of one group, the subjects taught in class, school levels, and filed of students behavior.

These variables are examined for the effect of flipped learning. Before using Comprehensive Meta-Analysis (CMA) and Statistical Package for the Social Sciences (SPSS), it is required procedure and usually spreadsheet like Microsoft Excel is a tool to arrange reliable data set<sup>13</sup>.

Table 1: Characteristics of Studies Included in the Analysis

Author	Effective Size	Data Format	Student Level	Course Name	Outcome
J. Bae (2015) <sup>14</sup>	0.185	SMCD	E / 5th	Digital Literacy	C/A/P
J. Bae (2016) <sup>15</sup>	0.658	SMCD	E / 2nd	Science	C
J. Choi (2015) <sup>16</sup>	0.821	SMD	M / 1st	Science	C/A/P
Y. Choi (2016) <sup>17</sup>	0.566	PP	C	Instructional Design	C/A
K. Chun (2016) <sup>18</sup>	0.368	PP	C / 2nd	Medicine	C/P
S. Hyeong (2016) <sup>19</sup>	0.965	PP	E / 4th	Music	C/A/P
J. Jeong (2015) <sup>20</sup>	1.554	SMCD	E / 5th	Science	C/A
M. Jeong (2015) <sup>21</sup>	0.175	SMCD	E / 4th	English	C/A
J. Jung (2015) <sup>22</sup>	0.282	SMCD	M / 1st	Math	C/A
Y. Jung (2016) <sup>23</sup>	0.142	SMD	E / 4th	Science	C/A
N. Kang (2015) <sup>24</sup>	0.247	SMCD/PP	C	English	C
E. Kim (2015) <sup>25</sup>	0.443	PP	M / 1st	Social Studies	C
E. Kim (2015) <sup>26</sup>	0.565	SMCD	JC	Nursery	C/A
M. Kim (2016) <sup>27</sup>	0.457	SMCD	H / all	History	C/A/P
M. Kim (2015) <sup>28</sup>	0.229	PP	M / 2nd	English	C/A
N. Kim (2014) <sup>29</sup>	0.220	PP	C	Physiology	A
B. Lee (2015) <sup>30</sup>	0.331	SMCD	E / 6th	Science	C/A/P
B. Lee (2016) <sup>31</sup>	0.334	SMCD	E / 6th	Science	C/A/P
H. Lee (2015) <sup>32</sup>	0.597	SMD	E / 5th	Social Studies	-
H. Lee (2015) <sup>33</sup>	0.634	PP	C	Business	A
S. Lee (2015) <sup>34</sup>	2.190	PP	C	English	A/P
J. Lim (2015) <sup>35</sup>	-0.352	PP	C	English	C
J. Lim (2015) <sup>36</sup>	0.042	PP	C	English	C
J. Oh (2015) <sup>37</sup>	0.059	PP	C	Multiple Classes	A
J. Park (2015) <sup>38</sup>	0.551	SMD	H / 3rd	Database	A/C
J. Park (2015) <sup>39</sup>	0.200	SMCD	E / 5th	Math	C
J. Park (2016) <sup>40</sup>	0.245	SMCD	M / 2nd	English	C
S. Park (2016) <sup>41</sup>	0.057	SMCD	H / 1st	Science	C
W. Park (2016) <sup>42</sup>	0.240	SMCD	C	Multiple Classes	A/C
S. Seo (2015) <sup>43</sup>	0.772	SMCD	E / 6th	English	A/C
Y. Seo (2015) <sup>44</sup>	1.339	PP	M / 2nd	English	A/C
Y. Seo (2015) <sup>45</sup>	0.803	SMCD	M / 2nd	English	C
Y. Shin (2016) <sup>46</sup>	0.252	SMCD	E / 5th	Science	A/C/P
E. Son (2015) <sup>47</sup>	2.445	PP	C	Multiple Classes	A/P
Y. Ye (2015) <sup>48</sup>	0.361	SMCD/PP	M / 1st	English	A/C
O. Yoo (2015) <sup>49</sup>	0.537	SMCD	H / 2nd	Chemistry	AC

SMCD = Standardized Mean Change Difference; E = Elementary school; C = Cognitive; A = Affective; P = Psychomotor;  
SMD = Standardized Mean Difference; M = Middle school; PP = Pre-post; before and after applying flipped learning;  
C = College

### C. Computation of Effects Sizes

The common metric is the effect size of three different data formats for this meta-analysis: pre-post design, experimental vs. control group design, and standardized mean change difference (pre-post with both experimental and control group) for the meta-analysis. The pooled estimate of the population standard deviation was used<sup>50</sup>, if possible. By both researchers, all effect sizes were calculated using Comprehensive Meta-analysis (CMA) with direction and inputs confirmed. The analysis was also carried out using CMA 2.0 software to estimate a mean effect size. Positive effect sizes were when flipped learning students did better than the control groups. In this study, figuring out the effect size was quite a delicate process, because the research reports and articles varied in the completeness of their reports of research results.

## III. ANALYSIS

### A. Combining Effect Sizes Across Studies

Once an effect size had been calculated for each study or comparison, the effects testing the same hypothesis were averaged<sup>13</sup>. Weighted analysis by Hedges and Olkin<sup>51</sup> as well as fixed effects categorical analysis, the fixed effects model, the random effects model, can be used for analysis.

Effect sizes more were weighted with larger samples in the weighted procedure, on the assumption that the larger samples more closely approximated the actual effects<sup>52, 53</sup>. For statistical significance by calculating the 95% confidence interval, these weighted combined effect sizes were tested<sup>12, 53</sup>.

The sample size of 36 studies is varying; this study has random effect model and fixed effect. For main effect size analysis, the consequences from those models are required. The sample group and class subjects are not quite homogenous; the random effect model is chosen for major effect and sub-group examination<sup>53</sup>.

### B. Analyzing Variances in Effects Sizes across Studies

The last step was to investigate the variability of the effect sizes using a homogeneity analysis<sup>12</sup>. The effect size calculated from former studies was checked for homogeneity since how homogeneous the whole effect size is evaluated<sup>49</sup>. The homogeneity is important factor to inspect moderator variables<sup>49</sup>. For the homogeneity test, the followed formula used:

$$Q = \sum_{i=1}^k \frac{(g_i - g.)^2}{v(g_i)} = \sum w_i (g_i - g.)^2$$

Where,  $w_i = 1/v(g_i)$ ,  $w_i$  means an inverse variance as an indication in the study<sup>13</sup>. First, a Q statistic is calculated for each subgroup of comparison. The value of these statistics is added up to get the value  $Q_w$  (within-group chi-square). Then, this value is subtracted from  $Q_t$  (chi-square distribution,  $N-1$  degrees of freedom) to get  $Q_b$  (between-group chi-square,  $Q_b = Q_t - Q_w$ ). The statistic  $Q_b$  is used to identify the homogeneity of the mean effect of grouping<sup>13</sup>. The grouping factor offers a significant contribution to the variance in the set of effect sizes if  $Q_b$  reaches a significant level<sup>13</sup>.  $Q_w$  is comparable to  $Q_t$ , meaning that there is a need for further grouping of the data if this statistic reaches a significant level<sup>12</sup>.

By Cohen, these consequences are classified as 0.2 is small, 0.5 is medium, and 0.8 is large in effect size respectively<sup>51, 57</sup>. In a meta-analysis, each study is independent as assumed, but there is dependency when the samples-former studies in this case have various effect sizes<sup>49</sup>. Sample contamination problem comes when the same sample usage; it is contradiction to independency. For this study I adopt Cooper's "shifting unit of analysis<sup>51</sup>", this method can reduce infringement of independency and best way to reserve the highest value since the effect size of this study is not fully independent as tested<sup>12</sup>.

### C. Results

This synthesis gave 288 effect sizes from 36 major studies and an average of 8 effect sizes per study. It is important to monitor the results dependency where a study has various numeral values in categories. Figure 1 presents all 36 studies' statistics as spotting graph showing how standard deviation is distributed from the 36 studies. It also represents confidence interval (CI) as the length of horizontal line of squares. Figure 2 shows the funnel plot of 36 studies.

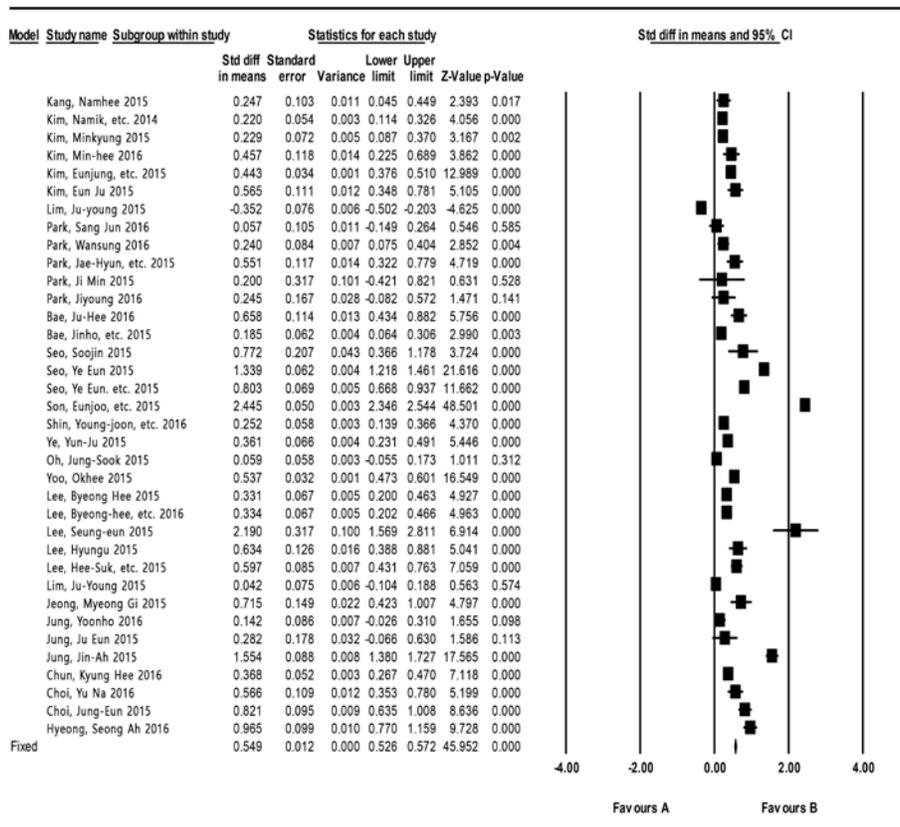


Figure 1: Forest Plot of 36 Studies

Funnel plot of standard error by std diff in means

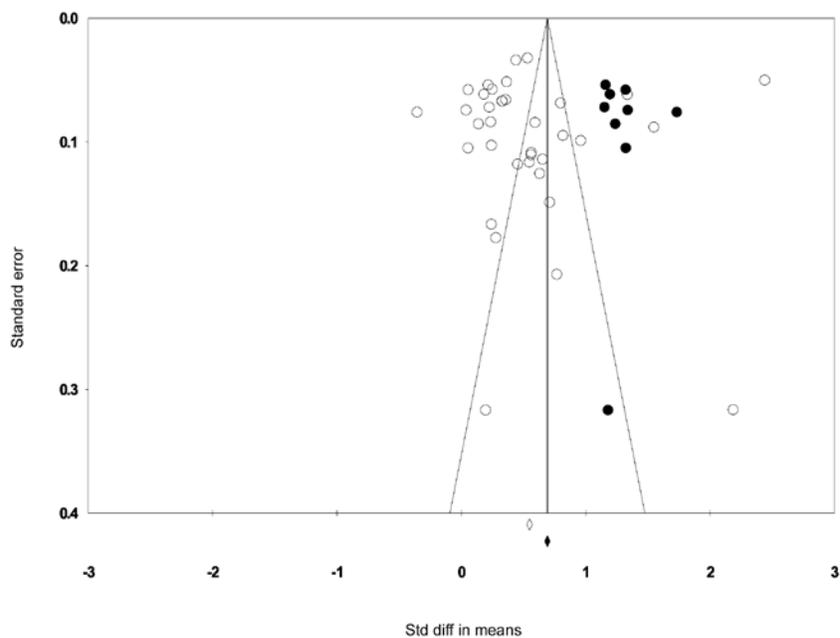


Figure 2: Funnel Plot of 36 Studies

Table 2 shows the output of the homogeneity test, in which the effect sizes of the major studies were heterogeneous ( $Q = 2280.4$ ,  $df = 35$ ,  $p < .05$ ). Therefore, we measured the overall effect size with the random-effects model and compared the effect sizes with the characteristics of each study (e.g., outcome variables, research method variables, study characteristics variables, etc.).

Table 2: Results of the Homogeneity Test

N	Q	p-value	-95%CI	ES	+95%CI	SE
36	2280.4	<.05	0.52	0.55	0.57	0.012
N = number of studies; Q = homogeneity statistics; CI = confidence interval; ES = effect size; SE = standard error						

In the results, the homogeneity test was statistically significant. Then, a random effects model analysis was conducted.

Table 3 presents the overall results of meta-analysis with a random effects model using the same method in the article<sup>56</sup>.

Table 3: The Overall Result of Meta-Analysis Using a Random Effects Model

N	-95%CI	ES	+95%CI	SE
36	0.35	0.54	0.97	.100

Because each sub-group was heterogeneous on the homogeneity tests, this study conducted a sub-group analysis with a random effects model. Sub-group analysis was performed to identify the variability and the moderators, which influences the direction and quantity of the relation and difference among sub-groups. The categorical variables are as follows: publication status, outcome domain, student level, data format, course name, and publication year.

Table 4: The Effect Size by Outcome Domain

Outcomes	Sub-outcomes	k	-95% CI	ES	+95%CI	SE
Outcome Domain	<i>Affective</i>	116	0.71	0.86	1.02	0.080
	<i>Cognitive</i>	134	0.42	0.53	0.63	0.053
	<i>Psychomotor</i>	19	0.18	0.51	0.84	0.166
<i>k</i> = number of effect size						

The results of flipped learning varied, in the random-effects categorical analysis by outcome, Table 4. In the outcome domain, the effect size of the affective (0.86), cognitive (0.53), and psychomotor (0.51) domains were in order. The effect of flipped learning more is related to students' affective aspects.

Table 5: Effect sizes by Subgroup: Data Format and Publication Type

Sub-group	Categories	k	-95% CI	ES	+95% CI	SE
Data Format	<i>Pre-post</i>	104	0.70	0.88	1.10	0.091
	<i>Experimental vs. control</i>	31	0.72	0.90	1.08	0.094
	<i>Mean change difference</i>	153	0.41	0.48	0.54	0.033
Publication type	<i>Dissertation</i>	134	0.62	0.71	0.81	0.047
	<i>Journal</i>	154	0.48	0.62	0.75	0.068

The data format has three different types in the major studies, namely pre-post design, experimental vs. control group design, and pre-post with experimentalvs. control group (standardized mean change difference) as measure in the study<sup>13</sup>.

The effect size is experimental vs. control (0.90), pre-post design (0.88), and standardized mean change difference (0.48).

So, the difference was not small, and study design may be a factor of effect size difference. The effect size of dissertation (0.62) was larger than journal article (0.48) in the publication type; however the difference was not significant as showed Table 5.

Table 6: Effect Sizes by Subgroup Related to Study Characteristics

Subgroup	Categories	<i>k</i>	-95% CI	ES	+95% CI	SE
<i>Student Level</i>	<i>E</i>	106	0.49	0.58	0.67	0.048
	<i>M</i>	35	0.56	0.82	1.07	0.130
	<i>H</i>	39	0.41	0.52	0.62	0.053
	<i>C</i>	74	0.48	0.72	0.95	0.122
<i>Subject</i>	<i>Korean</i>	3	0.01	0.52	1.003	0.260
	<i>English</i>	72	0.39	0.57	0.74	0.091
	<i>Math</i>	5	0.08	0.35	0.63	0.140
	<i>Science</i>	94	0.53	0.62	0.71	0.047
	<i>Social Studies</i>	9	0.35	0.67	0.99	0.163
	<i>History</i>	10	0.19	0.47	0.75	0.144
	<i>Computing</i>	6	0.24	0.56	0.89	0.168
	<i>Music</i>	4	0.71	0.98	1.26	0.141

The effect size of middle school student (0.82) was largest in the student level. Of the subjects, music (0.98), social studies (0.67), science (0.62), English (0.57), computing (0.56), and Korean (0.52) were greater than 0.5. The effect size of history (0.47), and math (0.35) are greater than 0.2.

Table 7: The Results of Random-effects Regression Analysis by Publication Year

Standard Parameter	Estimate	Error	<i>z</i> -value	<i>p</i> -value
<i>Intercept</i>	1021.4	141.8	7.20	0.000
<i>Publication year</i>	-0.51	0.070	-7.20	0.000

The meta-regression by publication is significant, but its slope of is negative.

#### IV. CONCLUSION

Since the flipped learning as new lecture method was introduced, there has been many research works done to prove their effects. This is the first trial to analyze the effect of flipped learning in Korean schools from published journals and dissertations from master and doctoral thesis with meta-analysis. Only several years have passed to adapt the method to Korean school classes by pioneering teachers. It is necessary to examine the effect of flipped learning with the study results as applying meta-analysis for how much the improvement is in the groups, school levels and grades, and subjects.

Consequently it is effective to increase students' recognition and class participation. The effect size 0.54 proves as medium to large scale in effect size in random effects model analysis. For a view of outcome domain, Korean students enhanced in the field of affective rather than cognitive and psychomotor domain. This is significant result where Korean students recorded very low scores in affective domain of international achievement tests such as PISA.

At certain student levels, the effect size of middle school students was the largest; the effect of flipped learning was high in middle school classes. In Korea, the Ministry of Education tries to give an exam-free semester for middle school students for various activities. Flipped learning is also a good approach to encourage their class participation.

Compared to each subject, music, social studies, science, English, computing, and Korean ranked greater than 0.5 of effect size respectively. The effect size of history and math were less than 0.5 but greater than 0.2. It is statistically significant because the slope of meta-regression by articles is positive.

For Korean students, the effect of flipped learning was larger in science and social studies. Math has the smallest effect and this should be investigated further in future studies. Overall, our results show that the perceived confidence of the flipped learning students in their practice knowledge was greater than that of their students educated within a traditional teaching environment. Although one of the limitation is the lack of homogeneity since there has not many studies published in Korea- sample numbers of meta-analysis are not big enough, flipped learning represents an effective approach to the Korean education problem. After

more studies published, it is important to analysis the effect of flipped learning across the results from studies for fulfilling quantitative and qualitative conditions.

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# A Cross-cultural Comparison of Food Advertising Appeals in Collectivistic and Individualistic Cultures

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## Abstract---

**Background/Objectives:** The purpose of this study is to examine how cultural values are portrayed in the contents of food advertising, based on individualism-collectivism which is the basic dimension of cultural variability confirmed in various cross-cultural comparative studies.

**Methods/Statistical Analysis:** Study 1 (content analysis) investigated the extent to which food-related magazine advertisements in Korea and U.S. portray its inherent collectivistic or individualistic cultural characteristics or values. Study 2 (experiment) was conducted to examine cultural comparisons in relative responses of collectivistic and individualistic food advertising messages in Korea and U.S.

**Findings:** Findings of this study showed that culture plays an important role in the usage and effectiveness of food advertising claims. Korean food advertising emphasized more collectivistic and less individualistic persuasive appeals than U.S. food advertising. Subjects in Korea rated advertisements that included collectivistic benefits were more favorably than advertisements that expressed individual interest. On the other hand, subjects in U.S. responded reversely in regard to collectivistic and individualistic food advertising appeals. The results of this research demonstrated that there was a difference in how food advertising is being promoted in collectivistic and individualistic societies.

**Improvements/Applications:** Results of the research suggested that cultural discrepancy in collectivism-individualism plays an essential part in persuasive communication processes. International advertisers and marketers should realize the importance of the cultural differences that exist in eastern and western countries.

**Keywords---** Advertising Appeals, Persuasion and Culture, Collectivism and Individualism, Cross-Cultural Advertising, Contents of Food Advertising.

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## I. INTRODUCTION

Many studies in cross-cultural persuasive communication have dealt with cultural differences in the process of international advertising and marketing. The premise of this domain is that cultural characteristics and creative strategies are portrayed in advertising messages in diverse cultures. In other words, it is expected the extent to which food-related magazine advertisements in collectivistic and individualistic countries reflect its inherent collectivistic or individualistic cultural values.

It is also founded that the effectiveness of collectivistic and individualistic food-related advertising claims is different in the two cultures. Most existing papers studied on the role of culture in persuasive messages have demonstrated that culturally unmatched advertising appeals are less pervasive and effective than are culturally matched advertising appeals<sup>1,2</sup>.

Although recent research found a change in the usage of collectivistic advertising appeals and individualistic advertising appeals<sup>3</sup>, for shared products such as food or groceries there is strong tendency that the usage and effectiveness of collectivistic advertising messages in Korea<sup>4</sup>. This research found that the extent to which the promoted goods were individually purchased or used (individual products) or with others (shared or common products) moderated the usage and effectiveness of advertising claims. The result of this research indicates that types of products could constrain the role of culture in persuasive appeals in cross-cultural advertising and marketing<sup>5</sup>. For shared products such as food-related product, cultural difference could influence the prevalence and effectiveness of advertising claims in collectivistic and individualistic cultures.

On the basis of this background, this article hypothesized that;

Hypothesis 1: Korean food advertisements use more collectivistic appeals and less individualistic appeals than U.S. food advertisements, whereas U.S. food advertisements use more individualistic appeals and less collectivistic appeals than Korean food advertisements.

Hypothesis 2: Subjects in Korea will respond food advertisements that include collectivistic benefits more favorably than food advertisements that express individual interest, whereas subjects in U.S. will rate food advertisements that emphasize individual interest more favorably than food advertisements that contain collectivistic benefits.

## II. MATERIALS AND METHODS

### A. Content Analysis

A content analysis was conducted to evaluate the extent to which food-related magazine advertisements in Korea and U.S. portrays its inherent collectivistic or individualistic cultural values. The result of study 1 was analyzed by using SPSS/WIN. Statistical methods used for Study 1 are frequency, chi-square and ANOVA analysis.

### Sample of Advertisements

One large circulation women's magazine and new magazine in each culture were chosen for the content analysis of food advertising<sup>5</sup>. This study focused on magazine advertisements because advertisements in print medium represent a large number of food-related advertising than other media such as broadcasting, on-line, and outdoor.

The time span for the content analysis was 2010 to 2015. A total number of 240 print advertisements (40 for each year) in each culture were analyzed.

Ad shown in [Table 1], each sample advertisements from the women's magazine and news magazine were 120 respectively (20 for each year).

Food-related advertisements appeared in the first 20 advertisements in each issue were included in the study.

Table 1: The Number of Advertisements Sampled in Each Culture

Category	2010	2011	2012	2013	2014	2015	Total
Women's	20	20	20	20	20	20	120
News	20	20	20	20	20	20	120
Total	120	120	120	120	120	120	240

### **Coding of Advertisements**

As shown in [Table 2], a coding manual in each culture was developed on the base of theory-based elements confirmed in various cross-cultural comparative studies.

Advertisements emphasized appeals about in dependence; individual enjoyment, self-improvement, and hedonism were categorized for individualistic messages. Advertisements expressed appeals about relationship with family or in-groups, group integrity, concerns about others, and group goals were coded for collectivistic messages<sup>6</sup>.

The sample advertisements were categorized by two independent coders who were ignorant of the hypothesis of the content analysis. Before the main coding, two coders were trained for one week to improve their coding accuracies.

Inter-coder agreement was 82% for coding individualistic and collectivistic appeals. Test-retest coding reliability was calculated by replicating the coding one month after the primary coding was performed. Test-retest coding reliability was 88% which was well within acceptable agreements in content analysis.

Table 2: Coding Criteria for Collectivistic and Individualistic Appeals

	Examples of advertisements
Collectivistic appeals	Ad expressing family happiness or integrity Ad about group integrity Ad emphasizing interdependent relationships to others Ad focus on harmony with family Ad concern with group goals Ad show about support of society
Individualistic appeals	Ad claims emphasizing individuality Ad focus on self-reliance with hedonism Ad focus on personal goals Ad emphasizing on individual well-being Ad about self-improvement or self-realization Ad emphasizing on person ambition

### **B. Experiment**

An experiment was conducted to examine cultural comparisons in relative responses of collectivistic and individualistic food advertising appeals. In study 2, participants in Korea and U.S. read magazine advertising that expressed collectivistic and individualistic messages, and answered dependent measures that evaluating the acceptance of those advertisements. The result of Study 2 was analyzed by using SPSS/WIN. Statistical method used for Study 2 was ANOVA.

#### **Subjects**

Korean subjects were 56 college students between the ages of 21 and 28 registered in advertising seminar class at a major university in Seoul, South Korea. American subjects were 58 college students between the ages of 19 and 26 registered in introduction to advertising and public relations class at a major university in Midwest.

The samples in both countries were instructed to read a magazine content and then an experimental advertisement. After reading the magazine and test-advertisement, they were rated their persuasiveness on a five-point scales.

#### **Experiment Materials and Dependent Measures**

Stimulus advertisements for experiment were written first in English. Korean version of stimulus advertisements was translated with a series of double-translations<sup>6</sup>. The headline, body copy and illustration of stimuli advertisements were taken from real print advertisements, raising the realism of the experiment materials. Dependent measures will include attitude toward advertisement, attitude toward brand, and purchase intention. All dependent measures will be rated on a 5-point scale (bad-good, negative-positive, and definitely buy-not buy). Subjects in both countries participated in groups of 20 to 30.

### III. RESULTS AND DISCUSSION

#### A. Results of Content Analysis

Korean food advertisements were expected to use more collectivistic appeals and less individualistic appeals than U.S. food advertisements, whereas U.S. food advertisements were expected to use more individualistic appeals and less collectivistic appeals than Korean food advertisements. [Table 3] summarizes the percentage of Korean and U.S. food advertising that emphasizing collectivistic and individualistic claims in magazine advertisements. As expected, the result of chi-square analysis clearly demonstrates that there was a statistically significant difference in the emphasis of collectivistic and individualistic messages in two countries (chi-square = 58.3,  $p < .01$ ). Hypothesis 1 is supported.

Table 3: Percentage of Collectivistic and Individualistic Appeals in Korean and U.S. Food Advertisements

	Korean advertisements	U.S. advertisements	Overall
Collectivistic appeals	58	32	50
Individualistic appeals	22	34	28
Not applicable	20	24	22

The reported numbers are percentages

#### B. Results of Experiment

Three dependent variables have shown good reliability as calculated by the Cronbach's alpha (0.876). Therefore, three dependent variables were combined in one index for the analysis.

Subjects in Korea were expected to respond food advertisements that include collectivistic benefits more favorably than food advertisements that express individual interest, whereas subjects in U.S. were expected to rate food advertisements that emphasize individual interest more favorably than food advertisements that contain collectivistic benefits.

As shown in [Table 4], Korean subjects showed more favorable response to collectivistic ad appeals than individualistic ad appeals (F value = 6.31,  $p < .01$ ) and U.S. participants rated more favorable response to individualistic ad appeals than collectivistic ad appeals (F value = 3.84,  $p < .05$ ). Meanwhile, there was a statistically significant interaction effect was found between Korean and U.S. subjects (F value = 11.24,  $p < .01$ ). Thus, hypothesis 2 is supported.

Table 4: Subjects' Response to the Collectivistic and Individualistic Advertisements

	Cultural values in advertising	
	Collectivistic advertisements	Individualistic advertisements
Korea	3.91 (0.92)	2.63 (1.12)
U.S.	3.52 (1.23)	3.88 (0.78)

The reported numbers are means with the standard deviations in parentheses.

#### C. Discussion

Although food advertising in many countries contains a large portion of total advertising budget, little attention has been taken in academic research in the cross-cultural environment<sup>7,8</sup>. Less than 10 articles have focused on cross-cultural comparative food advertising appeals<sup>9</sup> and their relationship with individualism and collectivism.

Based on the converging style of outcomes from the two studies completed in two cultures, it is obvious that culture plays a critical role in persuasion processes, affecting the predominance and the persuasiveness of different types of advertising messages.<sup>10</sup> The outcomes of this research were consistent with previous studies regarding the role of cultural effects in the process of international advertising strategy.<sup>11, 12, 13</sup>

### IV. CONCLUSION

The present research was conducted to understand a cross-cultural comparison of food advertising appeals in collectivistic and individualistic cultures. First, a content analysis was conducted to assess the

extent to which food-related magazine advertisements in Korea and U.S. portrays its inherent collectivistic or individualistic cultural values and appeals. Second, an experiment was conducted to examine cultural comparisons in relative responses of collectivistic and individualistic food advertising messages in Korea and U.S. using student samples in both cultures.

The results of this researched monstrated that there was a difference in how food advertising is being promoted in collectivistic and individualistic societies. The result of content analysis supported the notion that food advertising that expresses culturally relevant individualistic or collectivistic value was more used in individualistic and collectivistic cultures.

The result of experiment also found that subjects in collectivistic culture responded food advertisements that include collectivistic benefits more favorably than food advertisements that express individual interest, whereas subjects in individualistic culture rated food advertisements that emphasize individual interest more favorably than food advertisements that contain collectivistic benefits. For shared products such as food, there were big distinction between collectivistic and individualistic cultures in the popularity and persuasion of advertising claims.

This study contributes to the knowledge of academic and practical achievements regarding the influence of culture on persuasion processes, especially in the area of collectivism and individualism. Advertisers and marketers in cross-cultural settings should keep in mind these insights to make culturally relevant food advertising appeals.

This research is limited in several ways. First, it is useful to expand the number of countries in conducting studying the relationship between culture and persuasion. This study only involved two countries, Korea and U.S. To expand the reliability and validity of the research, future research should include more countries and examine the results of content analysis and experiment.

Second, one very critical limitation of content analysis is the medium used in this study. Only magazine advertisements were analyzed in this study. In future research, it is useful to include more advertising media such as television, on-line, outdoor, and radio in order to increase the universalization of the study.

Third, the types of culture relevant and irrelevant advertising appeals used in this research were only individualism and collectivism dimension. Other important cultural variabilities (for example, uncertainty avoidance, future and past orientation, humanism and materialism) which are basic dimensions of cultural difference identified in cross-cultural studies may also be valuable investigating the types of advertising messages that tend to be appeared and that tend to be persuasive in eastern and western cultures.

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# The Influence of Meaning of Life and Academic Self-efficacy on Nursing Students' Subjective Happiness

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## Abstract---

**Background/Objectives:** This study was done to identify the relationship between variables and influenced factors for developing nursing intervention program to promote a subjective happiness of nursing students.

**Methods/Statistical Analysis:** In this study, 343 nursing students in H city were selected for the descriptive survey. Data were collected using meaning of life, academic self-efficacy and subjective happiness questionnaire from September 5<sup>th</sup> to 30<sup>th</sup>, 2016. Data were analyzed with t-test, ANOVA, Pearson's correlation, and multiple regressions using SPSS WIN 18.0 program.

**Findings:** As a result, the score of the meaning of life, academic self-efficacy, and subjective happiness on nursing students were medium level. In correlation, the meaning of life was related to academic self-efficacy ( $r=.401$ ,  $p<.001$ ) and related to subjective happiness ( $r=.316$ ,  $p<.001$ ). Also, academic self-efficacy was related to subjective happiness of nursing students ( $r=.451$ ,  $p<.001$ ).

Influencing factors on subjective happiness were academic self-efficacy ( $\beta = .387$ ,  $p < .001$ ), meaning of life ( $\beta = .160$ ,  $p = .002$ ). These two factors explained 22.1% of the nursing students' subjective happiness. These results reveal that academic self-efficacy, meaning of life were significant factors on Nursing students' subjective happiness.

**Improvements/Applications:** These results indicate that meaning of life, academic self-efficacy should be considered for developing subjective happiness program of nursing students.

**Keywords---** Self-Efficacy, Happiness, Student, Nursing.

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## I. INTRODUCTION

Happiness is one of the basic human rights<sup>1</sup>. Especially, the perception of subjective happiness in their life has been emphasized when individual's quality of life is considered<sup>2</sup>. At the developmental stage, college students are responded to transitional period from late adolescence to adulthood with experiencing physical, psychological, and social change<sup>3</sup>, and the ego identity as an adult is important in this stage, so it is necessary to pay attention to the happiness perceived by individual<sup>4</sup>. In addition, emotional health of college students, including happiness, can affect maladjustment at work, which is the first experience of society after graduation<sup>4</sup>. It is known that positive emotion<sup>5</sup>, meaning of life<sup>2</sup>, and academic factors<sup>6</sup> are main influencing factors related to happiness.

Happiness or subjective well-being can be interpreted in life satisfaction, positive feelings<sup>7</sup>. Recently, in a survey<sup>8</sup> of OECD member countries, it revealed that in case of Korea, the level of life expectancy, educational attainment score are higher than the OECD average, but life satisfaction score is lower than the OECD average. Meanwhile, as regards academic factors, nursing students have experienced the difficulty of academic stress because of rigorous curriculum, excessive amount of learning, clinical training<sup>9</sup>.

As a result, the factors cause unstable emotion for nursing students, and it can lead decreasing subjective happiness<sup>10</sup>. Subjective happiness of nursing student is associated with not only the personal quality of life<sup>11</sup>, but also the care attitude of the patients<sup>12</sup>. Thus, it is needed to consider seriously about the subjective happiness of nursing students from the educational aspect to do as a future of professional care giver. Therefore, this research is aimed to understand the impact factors on the subjective happiness of nursing students, and to help develop a program for promoting happiness.

The specific purpose of study were to:

- 1) Identify the degree of nursing students' meaning of life, academic self-efficacy and subjective happiness.
- 2) Identify the meaning of life, academic self-efficacy and subjective happiness according to the general characteristics of subjects.
- 3) Identify the correlation between meaning of life, academic self-efficacy and subjective happiness for nursing students.
- 4) Identify the influencing factors of the nursing students' subjective happiness.

## II. METHODS

### A. *Sampling and Data Collection Method*

In this research, convenience sampling method was used to select 343 nursing students at college in H city.

We explained about the purpose of this study, and the freedom to withdraw from participation, since then received a consent form to participate.

### B. *Tools of Study*

**Meaning of life:** The meaning of life tool<sup>13</sup> was developed by Steger, Frazier, Oishi & Kaler, since then was validated Korean version<sup>14</sup> by Won, Kim & Kwon. In this study, validated Korean version<sup>14</sup> was used as a tool. Meaning of life consists of 10 questions.

**Academic self-efficacy:** The academic self-efficacy scale<sup>15</sup> developed by Kim & Park was used as a tool. The academic self-efficacy consists of 28 questions. The higher the score means the higher academic self-efficacy.

**Subjective happiness:** The subjective happiness scale<sup>16</sup> was developed by Lawton, and translated<sup>17</sup> by Kim, finally evaluated and revised<sup>18</sup> by Lee.

In this study, evaluated and revised scale<sup>18</sup> by Lee was used as a tool. It consists of 17 questions. Get high score means high subjective happiness.

### C. *Data Collection of Survey*

This survey data were collected using questionnaire from September 5<sup>th</sup> to 30<sup>th</sup>, 2016. Total 360 questionnaires were distributed, and then 350 copies were returned. Finally, 343 copies except poor 7 copies were used for data analysis.

#### D. Statistical Analysis

Final 343 survey data were used for analyzing with SPSS Win18.0 program. General characteristics of subjects were obtained using frequency and percentage.

The degree of meaning of life, academic self-efficacy and subjective happiness were analyzed using mean and standard deviation. For analyzing differences according to the general characteristics, t-test and ANOVA were used. Also, Pearson's Correlation Coefficient was used for the relationship between meaning of life, academic self-efficacy and subjective happiness.

To identify influencing factors of nursing students' subjective happiness, stepwise multiple regression method was used.

### III. RESULTS AND DISCUSSION

In this research, general characteristics of nursing students are as for Table 1. This report is based on 343 surveys. There were majority of female subjects(92.1%) and under 29 years old subjects(91.8%). Distribution of grade was almost similar.

121 subjects (35.4%) had other majors. Most of the subjects (80.4%) responded that they did not participate in regular exercise. Also, 189(55.3%)students answered that major purpose of nursing admission was getting a job.

Table 1: General Characteristics  
(N=343)

Variables	Characteristics	N	%
Gender	Male	27	7.9
	Female	316	92.1
Age*(yr)	<29	314	91.8
	30-39	22	6.4
	40-49	4	1.2
	50-59	2	.6
Grade	1st	77	22.4
	2nd	87	25.4
	3rd	96	28.0
	4th	83	24.2
Religion	Yes	129	37.6
	No	214	62.4
Another major	Yes	121	35.4
	No	221	64.6
Regular exercise	Yes	67	19.6
	No	275	80.4
Purpose of admission	Job	189	55.3
	Recommendation	63	18.4
	Realization of the humanity	33	9.6
	Others	57	16.7
Economic level	High	35	10.2
	Medium	251	73.2
	Low	57	16.6

Degree of meaning of life, academic self-efficacy and subjective happiness are as for table 2.

Data of nursing students showed  $50.01 \pm 9.38$  points out of the range of 10-70 points in meaning of life;  $85.43 \pm 13.08$  points out of the range of 28-140 points in academic self-efficacy;  $43.73 \pm 7.08$  points out of the range of 17-68 points in subjective happiness.

Table 2: Degree of Meaning of Life, Academic Self-Efficacy and Subjective Happiness

(N=343)

Variables	Range	Mean±SD	Min-Max
Meaning of life	10-70	50.01±9.38	20-70
Academic self-efficacy	28-140	85.43±13.08	28-126
Subjective happiness	17-68	43.73±7.08	24-62

The results of analysis for each variables' difference according to general characteristics showed as table 3. In meaning of life, there were significant differences in grade ( $F=4.778, p=.003$ ), regular exercise ( $t=2.895, p=.004$ ), purpose of admission ( $F=3.914, p=.009$ ).

Academic self-efficacy showed meaningful difference in gender ( $t=-2.280, p=.030$ ), grade ( $F=3.606, p=.014$ ), regular exercise ( $t=3.342, p=.001$ ) and subjective happiness showed meaningful difference only in regular exercise ( $t=3.399, p=.001$ ).

Table 3: Differences of Meaning of Life, Academic Self-Efficacy and Subjective Happiness according to General Characteristics

(N=343)

Variables	Characteristics	Meaning of life		Academic self-efficacy		Subjective happiness	
		M±SD	t or F(p)	M±SD	t or F(p)	M±SD	t or F(p)
Gender	Male	52.15±9.03	-1.237 (.217)	92.30±16.58	-2.280 (.030)	44.89±7.77	-.886 (.376)
	Female	49.82±9.40		84.84±12.60		43.63±7.03	
Age (yr)*	<29	49.65±9.36	1.791 (.149)	85.47±12.42	1.074 (.360)	43.60±6.99	1.045 (.373)
	30-39	54.32±9.63		85.50±21.27		45.82±8.44	
	40-49	49.50±3.11		77.00±7.12		41.50±6.14	
	50-59	53.00±7.07		97.00±7.07		48.00±7.07	
Grade	1st	50.21±8.15	4.778 (.003)	85.71±11.33	3.606 (.014)	44.95±6.97	2.413 (.067)
	2nd	51.89±9.89		88.87±13.76		44.48±7.90	
	3rd	47.13±9.50		82.67±13.46		42.33±6.61	
	4th	51.18±9.15		84.75±12.80		43.42±6.61	
Religion*	Yes	51.02±9.05	1.562 (.119)	86.67±12.79	1.363 (.174)	44.05±6.83	.660 (.510)
	No	49.39±9.55		84.68±13.23		43.53±7.24	
Another major	Yes	51.05±10.21	1.549 (.122)	85.79±16.06	.399 (.690)	43.44±7.51	-.548 (.584)
	No	49.41±8.88		85.13±11.08		43.88±6.87	
Regular exercise	Yes	52.87±9.36	2.895 (.004)	90.12±13.51	3.342 (.001)	46.37±7.32	3.399 (.001)
	No	49.21±9.21		84.43±12.16		43.12±6.90	
Purpose of admission	Job	48.77±9.62	3.914 (.009)	85.21±13.16	.706 (.549)	43.57±7.16	1.447 (.229)
	Recommendation	50.37±9.01		83.98±13.99		42.68±7.10	
	Realization of the humanity	54.45±7.30		87.70±9.04		43.82±4.79	
	Others	51.02±9.37		86.40±13.92		45.32±7.84	
Economic level	High	50.49±9.02	.877 (.417)	86.86±14.88	.515 (.598)	46.31±7.44	2.757 (.065)
	Medium	50.28±9.47		85.53±12.83		43.53±7.04	
	Low	48.51±9.23		84.09±13.15		43.00±6.82	

Correlation of meaning of life, academic self-efficacy, and subjective happiness on nursing students are as for table 4. As for the correlation between factors, meaning of life and academic self-efficacy ( $r=.401, p<.001$ ), meaning of life and subjective happiness ( $r=.316, p<.001$ ), academic self-efficacy and subjective happiness ( $r=.451, p<.001$ ) all showed positive correlation.

Table 4: Correlation of Meaning of Life, Academic Self-Efficacy, and Subjective Happiness of Nursing Students. (N=343)

Variables	Meaning of life	Academic self-efficacy	Subjective happiness
	r(p)	r(p)	r(p)
Meaning of life	1		
Academic self-efficacy	.401(<.001)	1	
Subjective happiness	.316(<.001)	.451(<.001)	1

Influencing factors on the Subjective Happiness are as for table 5. As for the result of multiple regression analysis, the influencing factors on nursing students' subjective happiness include academic self-efficacy ( $\beta=.387, p<.001$ ), followed by meaning of life ( $\beta=.160, p=.002$ ). And these two factors explained 22.1% of nursing students' subjective happiness.

Table 5: Influencing Factors of Nursing Students' Subjective Happiness (N=343)

Variables	B	SE	$\beta$	t	p
Constant	19.772	2.447		8.079	<.001
Academic self-efficacy	.210	.028	.387	7.431	<.001
Meaning of life	.121	.039	.160	3.075	.002
R <sup>2</sup> =.225 Adjusted R <sup>2</sup> =.221 F=9.453 P=.002 VIF=1.191 Dubin-Watson=1.851					

In this study, the influence factor of subjective happiness indicated by the academic self-efficacy ( $\beta = .387, p <.001$ ), meaning of life ( $\beta = .160, p = .002$ ). This can be understood in the same context as preceding researches. For example, meaning of life and academic factor correlate with life satisfaction<sup>6</sup>, and the greater the self-efficacy, the greater the satisfaction of life<sup>19,20,21</sup>. Also, positive emotions<sup>2,11</sup> and meaning of life<sup>2</sup> are influencing factors of subjective happiness. These researches support the results of this study. Finding at the above results, we can expect that encourage the academic achievement of nursing students is predicting factor for improving subjective happiness. Curriculum of nursing major consists of not only theory education but also more than 1,000 hours clinical training education, and it is very rigorous process. In particular, nursing students undergo a lot of stresses because of the national examination for the acquisition nurse license, interaction with health care workers including nurses in clinical practice, and an overloaded amount of learning. Those factors cause higher stress for nursing students than other major's students<sup>9,22</sup>. It is known that the influence factors of life stress and happiness of Korean nursing students are different from other major relatively<sup>10,23</sup>.

In this study, subjective happiness of nursing students is differences depending on whether or not to participate in regular exercise. It is necessary to investigate again for future due to the differences from other research results<sup>4,11</sup>. In this research, the meaning of life, academic self-efficacy, and subjective happiness in nursing students are moderate, so, for improving subjective happiness, it is needed to putting positive recognition for life, raising confidence for academic achievement. To assess problem, as a first step, periodic interviews and linking programs should be arranged from freshmen.

Considering the given educational situation of the nursing students, we can expect an important solution that improving the subjective happiness of nursing student is able to adapt to college life, employment and to prevent turnover<sup>11</sup>. In addition, the degree of subjective happiness of nursing students which shown in this study, is similar level as preceding research<sup>11</sup>. Thus, it has implication that we should seek ways actively for promoting the subjective happiness of nursing students. In the future, for the formation of professional attitude and values as a true long-term care provider to a patient, it is necessary to approach through the educational aspects.

#### IV. CONCLUSION & SUGGESTIONS

In this research, academic self-efficacy, meaning of life confirmed as the influenced factor of the nursing students' subjective happiness. Therefore, it is necessary to develop a program that can enhance the subjective happiness through positive academic self-efficacy, the meaning of life. Meanwhile, repeated studies are required for reconfirmation about influencing factors of nursing students' subjective happiness, also there is a need for comparative study of subjective happiness of other majors.

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## Development of Hanji-Bedclothes Fabric for which Paper Yarn is Used

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### Abstract---

**Background/Objectives:** This study intends to develop excellent functional paper yarn bedclothes fabric with deodorant efficiency over 80% which ensures coloring dyeing process development & form stability over 4th grade of color fastness to washing through pigment natural dyeing by using natural materials, paper yarn.

**Methods/Statistical Analysis:** The test fabric was designed in 4 types such as dobby, slub, mesh, plain. For weft, the same HJ13 paper yarn was used uniformly and both CM20 and CM10 were used for warp. Remained shrinkage was designed to be within 3% for warp and weft even after processing. Second, the developed paper yarn fabric was interwoven with cotton yarn and paper yarn.

**Findings:** The developed fabrics were developed with four kinds of fabric A (dobby), type B (slub), type C (mesh) and type D (plain) and they were used for tensile strength, bursting strength and KC safety test showed that all 7 items exceeded the world-class bedding or had the same level of functionality. And Unlike existing bedding, Hanji yarn fabric was woven using cotton yarn and Hanji yarn to maintain the functionality of Hanji, an eco-friendly natural fiber such as far-infrared ray emission, antimicrobial property, deodorization and rapid sweat discharge.

**Improvements/Applications:** It is expected that products in diverse uses can be produced by securing technology to manufacture paper yarn products which have form stability through developed paper yarn fabric.

**Keywords---** Bedclothes, Paper Yarn, Eco-Material, Fabric, Textile.

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## I. INTRODUCTION

As the health of modern men is seriously threatened due to changing climate and environment of the earth, consumers further request safe & agreeable environment-friendly products which are free from such danger & used in their houses.

The eco-friendly materials have been developed and used in various fields such as clothing, bedding, and toys. Especially, more than one-third of people participate directly in sleep, so the role of environmental justice is very big<sup>1</sup>.

According to the data surveyed by Statistics Korea<sup>2</sup> on the industrial trend of domestic living market and bedclothes market in 2010, bedclothes market with market size of Won 1 trillion & 300 billion, 10% of total living market, is constantly growing by average annual growth rate in 107%. According to preference study on bedclothes materials<sup>3</sup>, the preference of traditional cotton and cotton fabrics was high, but due to the increased interest in well-being, there was a demand for functional bedding and it was necessary to develop the material. New materials are diversely applied to develop bedclothes these days. The representative environment-friendly materials used for bedclothes are charcoal textile, tencel, wood pulp<sup>4</sup>.

Since paper yarn products which utilizes Mulberry textile as environment-friendly materials and functional materials have the property like anti-bacteria & deodorant, skin-friendly & quick drying, sun block function and far infrared radiation, their application is expanding to clothes, bedclothes, etc.<sup>5</sup>. As paper yarn textile made of Mulberry textile is also developed in the country, it is expected to be materials proper to functional bedclothes<sup>6</sup>.

According to the study of Park & Jung<sup>1</sup> which analyzed the present situation of environment-friendly textile used by domestic bedclothes brands in top 10 sales volumes, 'Evezary', 'ParkhonggeunHomeFashion', 'Sesaliving', 'Womanroad' used vegetal textile materials such as Tencel, 'Modal', bamboo, etc. for actual bedclothes products. Brands such as Arpeggio, 'Nimfuman', 'Chezmoi' used them for linings of pillow, quilt. 'Bamboo', 'Sissel' and mineral textile materials such as 'loess', 'charcoal', etc. were used as unitary material. Combined environment-friendly synthetic materials like Micromodal, 'Tencel ramie' are also produced. With respect to production method, pigment bedclothes are ideal for sound sleep, because they are light and comfortable. Since fabric is boiled and steamed, foreign materials are removed in dyeing process and dried by hot wind for sterilization and antibacterial effect, they are quite resistant to germ, an atopic dermatitis, helping consumers to sleep soundly without worrying about skin contact. So they are quite welcomed by consumers<sup>7</sup>.

As a result of previous studies using environment-friendly materials such as Hanji, research on clothing-related products using Hanji has mainly focused on consumer survey research<sup>4, 8, 9</sup>, on practical Korean traditional clothes design development research<sup>10</sup>, and design production & production study on shroud of paper yarn<sup>11</sup>.

The study on consumer attitude and behavior to products made of paper yarn on the basis of consumer survey<sup>12</sup> showed that use is limited to wall paper, window paper and copying paper that consumers are not interested in fashion accessory product or clothes, because consumers firmly limit the use of traditional paper yarn to that of paper.

Although the area where paper yarn is applied to clothes products is diversely expanded to underwear & outer garment these days, the development of Hanji bedclothes products which actually make use of paper yarn is hardly studied. Thus, it is thought that development of Hanji bedclothes which utilizes actual paper yarn needs to be studied as consumers are further interested in well-being and environment-friendly clothes products.

Thus, the purpose of this study is to develop excellent functional paper yarn bedclothes fabric with deodorant efficiency over 80% which ensures coloring dyeing process development & form stability over 4th grade of color fastness to washing through pigment natural dyeing by using natural materials, paper yarn. Since the products developed through the research have secured the technology to manufacture the textile products with the shape stability, it is possible to make the related products more advanced and it can be used for various purposes, which is important for achieving the high added value of Hanji corporation and related industries.

## II. MATERIALS AND METHODS

### A. Issues of the Study

This study intends to develop paper yarn bedclothes fabric that has form stability and excellent functionality through natural pigment dyeing by using natural materials paper yarn and the specific issues of study are as follows.

First, high-density fabrics that are highly hygroscopic property and can be made into bedclothes.

Second, fabrics in various colors should be developed through the natural pigment dyeing.

Third, fabric that has form stability such as washing shrinkage ratio similar to that of ordinary bedclothes products should be developed.

### B. How to Study

#### Selection of Paper Yarn

The paper yarn used for test was bought as its design was requested to SSangyoung Bangeok. Base paper with low weight below 14g/m<sup>2</sup> was produced of fine paper yarn with thickness below 1.5mm in the conditions in Table 2, e.g., T/M of 760, Twisting speed, standard moisture in 10.3%, drying temperature in 150°C depending on weight.

The thickness of paper yarn is shown in Table 1 according to detailed weight of base paper and the slitting width and the HJ 13 and CM 20 are purchased from the manufacturers.

Table 1: Fineness of Paper Yarn as Base Paper Weight and Slitting width

weight \ Width	12g/m <sup>2</sup>	13g/m <sup>2</sup>	14g/m <sup>2</sup>	15g/m <sup>2</sup>	16g/m <sup>2</sup>	17g/m <sup>2</sup>
1.5mm	162d	177.5d	189d	202.5d	216d	229.5d
2mm	216d	234d	252d	270d	298d	306d
3mm	324d	351d	378d	405d	432d	459d
4mm	432d	468d	504d	540d	576d	612d
5mm	540d	585d	630d	675d	720d	765d
6mm	648d	702d	756d	810d	864d	918d
7mm	756d	819d	882d	945d	1008d	1071d
	Low yarn count (under 230d)		Middle yarn count (230~600d)		High yarn count (600d over)	

Table 2: Production Condition of Paper yarn

T/M	760	Twisting speed	8500R.P.M
Standard Moisture	10.3%	Drying Temperature	150°C

#### Designing Paper Yarn Fabric for Bed Clothes

Like the conventional cotton, the paper yarn bedclothes fabric to be developed has demerits, namely, when cellulose textile is wet with sweat, it is hardly dried and heavy, causing stench by combining with sweat. Cotton is properly mixed with paper yarn to solve such demerit.

As paper yarn is quite hygroscopic, it causes no static electricity. Paper yarn and cotton are woven together as human body-friendly textile which does not irritate skin thanks to high moisturizing property and the detailed feature of paper yarn depending on the type of test fabric was presented in Table 3.

Table 3: Characteristics of Hanji-Bedclothes using Paper Yarn

T- No.	Type	Percentage of blending (%)	Yam		Density		Width before treatment	Width after treatment	Width after washing	Remained shrinkage	
			Warp	Weft	Warp	Weft				Warp	Weft
A	Dobby	31	CM 20	HJ 13	63	59	63	59	58	3	14
B	Slub (Paper yam)	30	CM 20	HJ 13	66	46	63	58	57	2	33
C	Mesh (Paper yam)	25	CM 10	HJ 13	67	58	63	59	58	-	-
D	Plain (Paper yam)	30	CM 20	HJ 13	66	46	63	58	57	23	14

The type of test fabrics was designed in 4 dobby, slub, mesh, and plain. All wefts used were the same HJ13 paper yarns and CM20 and CM10 were used for warp yarns. Remained shrinkage was designed to be within 3% of all warp and weft after processing.

When comparing paper yarn fabric to be developed with the existing bedclothes in the functional aspect, the required technical development spec was set up on the basis of global bedclothes and distributor and the specific spec was presented in Table 4. For basic indices, 7 items such as tensile strength, bursting strength, wear strength, pilling, color fastness to washing, deodorant efficiency, KC Safety test were selected.

Table 4: Technical Development Spec of Paper Yarn Fabric

Index	Unit	Objective goal	World best level	weight (%)	Standard Test
Tensile strength	N	500 over	650 (same bedclothes level)	10	KS K 0815
Bursting strength	kPa	800 over	800 (same bedclothes level)	10	KS K 0351
Wear strength	count	10,000 over	10,000 (distribution company)	10	KS K 0604
Pilling	Grade	4 over	4 (distribution company)	10	KS K 0503
Color fastness to washing	Grade	4 over	4 (luxury products)	30	KS K ISO 105
Deodorant efficiency(120min.)	%	80 over	-	20	Detector tube method
KC Safety test	-	Fitness	-	10	KC Safety standard

### III. RESULTS AND DISCUSSION

#### A. The Functionality Indices of Developed Paper Yarn

The degree of attaining development indices to measure the functionality of developed paper yarn bedclothes fabric was presented in Table 5.

In each index, tensile strength exceeded 745N in average (warp 1100N, weft 390N) in excess of the goal, 500N. Considering that the bedclothes in top global level are 650N, it was quite excellent. Exceeding the goal, 800kPa, bursting strength was 1,003kPa which was much higher than top global bedclothes in 800kPa. Exceeding the goal, 10,000 count, wear strength was measured to 20,000 count. Considering that wear strength of bedclothes distributed in domestic market is 10,000 count, it is higher by more than 2 times. Pilling and color fast to washing also attained the goal, "over 4th grade", which is or was same to that of bedclothes distributed in domestic market and that of world deluxe products. While the goal of deodorant efficiency was set up to 80%, it was measured to "over 99%", exceeding the goal. Finally, KC safety test was also judged to be proper to bedclothes.

Table 5: The Degree of Attaining Development Indices to Measure the Functionality of Developed Paper Yarn Bedclothes Fabric

Indices	Unit	Objective goal	Assessment degree of achievement
Tensile strength	N	500 over	warp :1,100, weft : 390 Mean : 745
Bursting strength	kPa	800 over	1,003(100%)
Wear strength	count	10,000 over	20,000 over(100%)
Pilling	Grade	4 over	4.0(100%)
Color fastness to washing	Grade	4 over	4-4grade(100%)
Deodorant efficiency(120min.)	%	80 over	99 over(100%)
KC Safety test	-	fitness	fitness(100%)

### **B. Property of Paper Yarn Fabric**

The result of analyzing handle of developed paper yarn fabric was presented in Table 6 and its feature is as follows.

Type A(dobby) was interwoven with warp of CM20' and weft of HJ13' + CM20' in 3:3. Namely, cotton of 20' was used in warp direction and paper yarn was used for weft. To reinforce weft, cotton 20 was used in 3/3 and made of fabric proper for pad, pillow, cushion. Remaining shrinkage is within 3%, very excellent value.

Type B(Stub) was interwoven with warp of CM20' and weft of HJ13' + CM20' in 1:1. To reduce the rigidity of paper yarn, it was interwoven with cotton on the weft surface. Further, the weight of fabric was light not to make quilt and quilting pad heavy.

Type C(Mesh) was interwoven with warp of CM10' and weft of HJ13' + CM20'. For the property of mesh, the content of paper yarn in other fabric was designed from 30% to 25%. It was interwoven so that it could be properly used for pad in bedclothes. Since shrinkage of weft was quite high, additional work was required after washing in the process of dyeing.

Type D(Plain) was interwoven with warp of CM20' and weft of CM20'+ HJ13'. Remaining shrinkage was set up to be below 3% so that the product could be evenly used in all bedclothes such as quilt, pad, pillow, and cushion. Further, the part contacting body was designed with paper yarn and in dual texture whose out shell was cotton.

### **C. Process of Paper Yarn Fabric**

The pre-treatment prescription & condition of fabric was set and applied to optimize the process of paper yarn bedclothes fabric.

The name of materials used for pre-treatment which was applied to pre-treatment and company name is presented in Table 7.

Considering the property of paper yarn fabric which has rough handle and impurities in higher contents, scouring process was set to 95°C×30min., GS-35 0.5 g/L and washing was set to 40°C×20min. 2 times. The quantity of scouring agent in use was increased to 7% in order to heighten scouring property.

The Hanji-bedclothes fabric developed through natural pigment dyeing is shown in Figure 1 and color over the 4th grade of color fastness to washing was embodied so that it could be used as diverse bedclothes products of high added value later.

Table 6: The Handle analysis of Hanji-bedclothes using paper yarn

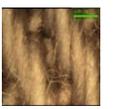
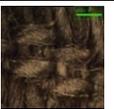
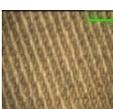
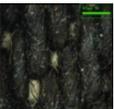
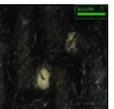
Magnification \ Type	40×	100×	200×
A			
B			
C			
D			

Table 7: Materials used for Pre-Treatment

Material	Company
Hydrogen peroxide 35%	OCI Company Ltd.
Sodium hydroxide 50%	OCI Company Ltd.
Snobil DS	Snogen Ltd.
Snobil GS-35	Snogen Ltd.
Acetic acid 80%	-
Terminox 20L	Novozymes Korea Ltd.



Figure 1: Hanji-Bedclothes Were Developed with Pigment

#### IV. CONCLUSION

This study is done to develop paper yarn bedclothes fabric with excellent functionality, color over the 4th grade of color fastness to washing, deodorant efficiency over 80% ensuring for stability through natural pigment dyeing by using natural materials, paper yarn. The specific conclusion is as follows.

First, the fabric was developed in 4 types, type A(dobby), type B(slub), type C(Mesh), type D(plain). It was found that they have functionality far surpassing or equaling to that of international bedclothes in all 7 items such as such as tensile strength, bursting strength, wear strength, pilling, color fastness to washing, deodorant efficiency, KC Safety test.

Second, for developed paper yarn fabric, the demerit of existing cellulose was improved completely, namely, when the existing cellulose was wet with sweat, it was hardly dried and heavy, causing stench due to erosion of sweat ingredient as skin adhered to bedclothes. Then, environment for use was extremely worsened.

Third, unlike conventional bedclothes, the developed paper yarn fabric was interwoven with cotton yarn and paper yarn. Thus, it keeps functionality of environment-friendly natural textile, paper yarn, far infrared ray emission, antibacterial property, deodorant, prompt discharge of sweat, etc. Further, the durability & form stability, the requirement of bedclothes is ensured.

Fourth, since the developed paper yarn fabric built the base to ensure variety and reproducibility of color through pigment dyeing method, it could contribute to the diversification of paper yarn bedclothes design.

It is expected that the company will be able to expand the production to various applications by securing manufacturing technology of Hanji, which has been granted shape stability through the developed Hanji fabric. Further, it is also expected that such technology could contribute to high added value of paper yarn and products related to paper yarn.

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## The Influence of Meaning of Life and Attribution Style on Academic Self-Efficacy of the Undergraduate Students

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### Abstract---

**Background/Objectives:** This research studies correlation between 'Meaning of Life', 'Attribution Style' and 'Academic Self-efficacy' of undergraduate students, and examine how 'Meaning of Life' and 'Attribution Style' may affect their 'Academic Self-efficacy'.

**Methods/Statistical Analysis:** We ran a survey on 243 students attending C university from August, 29<sup>th</sup> to September, 2<sup>nd</sup> 2016. Questionnaire consisted of total 77 questions categorized into; 7 Questions asking General Characteristics, 10 Questions from MLQ tools for the 'Meaning of Life', 32 questions based on tool developed by Levensen and revised for the 'Attribution Style', 28 questions to measure 'Academic Self-efficacy' through self-efficacy scale developed and verified by Kim & Park.

**Findings:** General Characteristics of the subjects were as followed; whom in grades are 1<sup>st</sup> grader 79 person(32.5%), 2<sup>nd</sup> grader 76 person(31.3.9%), 3<sup>rd</sup> grader 69 person(28.4%), and 4<sup>th</sup> grader 19 person(7.8%). In age groups, under age 29 being 230 people (94.7%) account for majority of group, Yes for religion was 164(67.5%) and no was 79(32.5%). Meaning of life scored mean score of 5.09(SD=0.73) out of 1-7 scale, and among the sub-factors, 'Meaning search' was the higher than 'Meaning discovery'. Mean score of 'Attribution Style' was 3.37(SD=0.31) within 1-5 scale, 'Ability' was the highest sub-factor. Mean score of 'Academic Self-efficacy' scored 3.07(SD=0.41) within 1-5 scale, the 'Self-control efficacy' was highest sub-factor. Factors relevant to 'Academic Self-efficacy' of the undergraduate students were 'Meaning of Life' and 'Attribution Style' ( $r=.135$ ,  $p<.05$ ). 'Attribution Style' and 'Academic Self-efficacy' showed no correlation with sub-factors except for Self-control( $r=.162$ ,  $p<.05$ ) and Confidence( $r=-.141$ ,  $p<.05$ ). As a result of multiple regression analysis, factors influencing student's Academic Self-efficacy were Meaning of Life, Meaning Discovery, Ability, Others, Luck as in order, have explanation power of 15%.

**Improvements/Applications:** In education, we should also consider undergraduate student's perceived meaning of life, and attribution style factors for them to be capable of using positive coping strategy promoting their academic self-efficacy.

**Keywords---** Meaning of Life, Attribution Style, Academic Self-efficacy, Undergraduate Students, Descriptive Study.

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## **I. INTRODUCTION**

Before entering society, undergraduate students should be capable of solving various tasks such as completing their ability, while finding ego, be concerned about career, and being prepare for the future<sup>1,2,3</sup>. Thus while attending the class, they should achieve academic achievement and be prepared requirements for future and make an effort to possess competitiveness in order to be a lifetime learner. Meanwhile, meaning of life means basic desires being fulfilled directly while mankind seeks for some goals in life, and mankind assigning a meaning to task about life means establishing a goal for the life<sup>4</sup>. Research<sup>5</sup> targeted undergraduate students to verify the meaning of life, and as a result, human relationship and future goal, or feelings or activity attached to this appeared to be most important. Also for human to accomplish their goals, we can distinguish the case in which internal state wishes, or result that is desired with connection to external environment. Attributional Theory is a theory where tendency to explain an event or a result of action with casual explanation, Attribution Style differed from individuals, and that tendency of casual reasoning causes behavior change afterward<sup>6</sup>. Thus academic self-efficacy differs from student's perceived meaning of life, and attribution style.

Therefore this research compares correlation of academic self-efficacy related variables, so students can set positive life meaning to be a lifetime learner in order to suit the requirement of future society, and correctly perceive internal and external attribution style, thus provide fundamental data for not only development of coping strategy for academic self-efficacy, but also for the career guidance.

Specific purpose of this study is as followed

- 1) To understand the undergraduate student's meaning of life, attribution style, and level of academic self-efficacy.
- 2) To understand correlation between undergraduate student's academic self-efficacy associated variables.
- 3) To understand factors affecting undergraduate student's academic self-efficacy.

## **II. METHOD OF STUDY**

### **A. Subjects**

Subjects of this study are 260 students who enrolling at each of Gyeong-gi, Chung-cheong districts by convenience sampling. After describing purpose of study, content of questionnaire and reward, personal information protection, the researcher collected data from August 29<sup>th</sup> 2016, to September 2<sup>nd</sup>. All subjects wrote their signature on consent form.

Total 260 surveys were handed out 252 turned in excluding 9 samples inadequate for data analysis, 243 copies were used for final data analysis.

## **B. Tools**

The questionnaire of the study consists of total 77 questions; meaning of life 10 questions, attribution style 32 questions, academic self-efficacy 28 questions, and general characteristics 7 questions.

**Meaning of life:** A tool of Meaning of Life Questionnaire (MLQ) developed<sup>7</sup>, self-report measure validated targeting domestic undergraduate student, the meaning of life scale Korean version<sup>8</sup> was used.

**Attribution style:** to measure attribution style, attribution style test tool based on test tool developed<sup>9</sup> and revised<sup>10</sup> was used.

**Academic self-efficacy:** to measure self-efficacy scale, academic self-efficacy scale developed and adequacy verified<sup>11</sup> was used.

## **C. Data Analysis**

Collected data was analyzed using SPSS Win 21.0 program. Meaning of life in undergraduate student, attribution style, and academic self-efficacy level was calculated into average and standard deviation. Pearson's Correlation Coefficient was used to find out correlation between undergraduate student's meaning of life, attribution style, and academic self-efficacy.

Stepwise Multiple Regression was used to evaluate undergraduate student's academic self-efficacy relevant influence factors.

## **III. RESULTS**

### **A. The General Characteristics of the Subjects**

General characteristics of subjects in this study are exactly equate to Table 1. Subjects of this study are total 243 person, whom in grades are 1<sup>st</sup> grader 79 person(32.5%), 2<sup>nd</sup> grader 76 person(31.3.9%), 3<sup>rd</sup> grader 69 person(28.4%), and 4<sup>th</sup> grader 19 person(7.8%).

In age groups, under age 29 being 230 people (94.7%) account for majority of group, Yes for religion was 164(67.5%) and no was 79(32.5%). Incentives to nursing department were Employment 125 person(51.4%), Recommendation from around 40 person(16.5%), to Realize Humanity 33 person(13.6%) and 45 person(18.5%) checked others. Economic Levels were High 27 person(11.1%), Middle 179 person(73.7%), Low 37 person(15.2%), and Major in other field was 72 person(29.6%), and have not Majored in other fields were 171 person(70.4%).

Case of Regular Exercise were 46 person(18.9%), 186 person(76.5%) answered no to Regular Exercise, and 11 person (4.5%) answered others, In case of Regular Sleep was yes 78 person(32.1%), no 165 person(67.9%), and others 0(0%).

Table 1: The General Characteristics

(N=243)

Characteristics	Categories	N(%)
Grade	1st	79(32.5)
	2nd	76(31.3)
	3rd	69(28.4)
	4th	19(7.8)
Age(year)	Twenty	13(10.7)
	Thirty	54(44.3)
	Forty	55(45.1)
Level of education	High school	68(55.7)
	College	39(32.0)
	University	15(12.3)
Monthly income (10,000won)	>200	5(4.1)
	200-300	75(61.5)
	≥300	42(34.4)
Career (year)	>1	27(22.1)
	1-3	11(9.0)
	3-5	18(14.8)
	≥5	66(54.1)
Marital status	Single	60(49.2)
	Married	47(46.2)
	Others	5(4.1)
Estimation of occupational environment	High	23(18.9)
	Medium	80(65.6)
	Low	19(15.6)
Alcohol drinking (≥1times/week)	Yes	67(54.9)
	No	54(44.3)
	Others	1(0.8)
Smoking(≥5/day)	Yes	49(40.2)
	No	72(59.0)
	Others	1(0.8)

### **B. Extents of Meaning of Life, Attribution Style, Academic Self-Efficacy of Undergraduate Student's**

Undergraduate student's 'Meaning of Life', 'Attribution Style', and 'Academic Self-Efficacy' scores are shown in Table 2. In details, 'Meaning of Life' scored mean score of 5.09(SD=0.73) out of 1-7 scale, and among sub-factors, 'Meaning Search' scored higher than 'Meaning Discovery'. Mean score of 'Attribution Style' was 3.37(SD=0.31) out of 1-5 point scale, 'Ability' scored the highest among the sub-factors. Lastly mean score of 'Academic Self-Efficacy' scored 3.07(SD=0.41) out of 1-5 point scale, and 'Self-Control Efficacy' scored highest among the sub-factors.

Table 2: Extents of Meaning of Life, Attribution Style, Academic Self-Efficacy

Categories		Mean	SD
Meaning of Life	Meaning search	2.73	0.59
	Meaning discovery	2.33	0.30
	Total meaning of life	5.09	0.73
Attribution Style	Ability	2.92	0.38
	Effort	2.69	0.38
	Others	2.25	0.42
	Luck	2.54	0.49
	Total attribution style	3.37	0.31
Academic Self-Efficacy	Preference task difficulty	2.82	0.62
	Self-control efficacy	3.36	0.53
	Pride	2.41	0.48
	Total academic self-efficacy	3.07	0.41

**C. Relationships Between Meaning of Life, Attribution Style, and Academic Self-Efficacy of Under Graduate Student's**

Correlation between each key figure is as shown in Table 3 below. Factors relevant to Academic Self-Efficacy of the undergraduate students were 'Meaning of Life' and 'Attribution Style' ( $r=.135, p<.05$ ), and 'Academic Self-efficacy' ( $r=.288, p<.001$ ) showed positive correlation, whereas 'Attribution Style' and 'Academic Self-efficacy' showed no correlation with sub-factors except for 'Self-control'( $r=.162, p<.05$ ) and 'Confidence'( $r=-.141, p<.05$ ).

Table 3: Relationships between the Meaning of Life, Attribution Style, and Academic Self-Efficacy

Variables	Meaning search	Meaning discover	Meaning of life	Ability	Effort	Others	Luck	Attribution style	Preference task difficulty	Self-control efficacy	Pride	Academic self-efficacy
	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)
Meaning discovery	.276**	1	.633**	.064	-.053	.133*	.056	.087	.071	.128*	.049	.118
Meaning of life	.919**	.633**	1	.168**	.112	.059	-.010	.135*	.202**	.324**	.079	.288**
Ability	.176**	.064	.168**	1	.701**	.005	-.052	.651**	.124	.381**	.064	.265**
Effort	.166**	-.053	.112	.701**	1	-.214**	-.207**	.494**	.145*	.309**	.065	.243**
Others	.006	.133*	.059	.005	-.214**	1	.580**	.610**	-.041	-.079	-.220**	-.148*
Luck	-.041	.056	-.010	-.052	-.207**	.580**	1	.609**	-.052	-.168**	-.201**	-.189**
Attribution style	.124	.087	.135*	.651**	.494**	.610**	.609**	1	.067	.162*	-.141*	.050
Preference task difficulty	.215**	.071	.202**	.124	.145*	-.041	-.052	.067	1	.288**	.247**	.766**
Self-control efficacy	.338**	.128*	.324**	.381**	.309**	-.079	-.168**	.162*	.288**	1	.240**	.708**
Pride	.072	.049	.079	.064	.065	-.220**	-.201**	-.141*	.247**	.240**	1	.652**
Academic self-efficacy	.297**	.118	.288**	.265**	.243**	-.148*	-.189**	.050	.766**	.708**	.652**	1

\*= $p<.05$ , \*\*= $p<.01$ , \*\*\*= $p<.001$

**D. Subordinate Factors of Meaning of Life and Attribution Style Affecting the Academic Self-Efficacy of Undergraduate Student's**

As a result of multiple regression analysis, factors relevant to 'Academic Self-efficacy' appeared to be 'Meaning of Life'( $\beta=.296, p=.000$ ), 'Meaning Discovery' ( $\beta=-.062, p=.000$ ), 'Ability' ( $\beta=.193, p=.000$ ),

'Others' ( $\beta=-.084$ ,  $p=.000$ ), 'Luck' ( $\beta=-.117$ ,  $p=.000$ ), as in orders, and as shown in table 4, this variables explained Academic Self-efficacy by 15%.

Table 4: Subordinate Factors of Meaning of Life and Attribution Style Affecting the Academic Self-Efficacy

Dependent variable	Independent variables	B	$\beta$	t	F	Adjusted R <sup>2</sup>	p
Academic self-efficacy	Meaning of life	.463	.296	3.784	8.098	.150	0.000
	Meaning discovery	-.238	-.062	-.799			
	Ability	.592	.193	2.252			
	Others	-.228	-.084	-1.120			
	Luck	-.284	-.117	-1.604			

#### IV. DISCUSSION

This research was conducted to understand how undergraduate student's perceived meaning of life and attribution style affect academic self-efficacy. For this purpose, students enrolling in C university of C area was surveyed, and correlation and multiple regression analysis was conducted.

First, subject's meaning of life, attribution style score and the level of academic self-efficacy was perceived above average level.

Second, meaning of life, attribution style and self-efficacy showed pure correlation, attribution style and sub-factor of academic self-efficacy, self-control showed pure correlation, and with confidence showed negative correlation. This can be interpreted that student with higher ego-concept attribute their success more to their ability, and inversely students attributing success more to their ability attains better ego concept. Also through associated previous studies, internal attribution style and academic motivation shows positive relationship, and external attribution style shows negative relationship<sup>12</sup>. Learning in college is a self-regulatory that undergraduate students therefore discover and pursue meaning of life that affect academic self-efficacy, and applying attribution training program that attribute result of learning more to factors relevant to self rather than to luck or others could be considered<sup>1,6,12</sup>.

Influence factor for undergraduate student's academic self-efficacy, as a result of multiple regression analysis, were meaning of life, meaning discovery, ability, others, lucks as in orders, and these variables explained academic self-efficacy by 15%.

During college student period, strong desires to possess meaning in life appears more than any other developmental stages<sup>13,14</sup>, but status of not having meaning while experiencing academic stress aggravates distress, thus shown from existing studies, where attempts to find meaning should lead to establishing true life meaning is once more emphasized. Attribution style is shown to affect academic self-efficacy by ability, others, and luck in orders showing little difference from Song's study<sup>15</sup> where internal attribution patterns

(12.2%) solely affect academic motivation. It could be presumed that recently impotent feelings are increasing among young people because of classification made upon component of origin.

Concluding these results, for the case of undergraduate students in Korea, their academic maladaptation because of career problems et al, could possibly affect their perceived meaning of life, academic self-efficacy along with attribution style. Thus education and programs to enhance nursing student's academic self-efficacy is necessary.

## V. CONCLUSION AND SUGGESTIONS

We should concern more about meaning of life, attribution style of the nursing students which appeared to be affecting undergraduate student's academic self-efficacy. On the progress of pursuing meaning of life for the college student, students acknowledge the fact that discovering meaning of life, and as their meaning gets greater, one can prove more academic self-efficacy. For the attribution style, internal variables such as ability and efforts are important, but rather than making an effort, external variables such as others and luck are shown to affect more in nursing students to exhibit academic self-efficacy. Therefore, in order to prevent student's severe academic maladjustment, further multilateral study on their academic self-efficacy, discovering meaning of life, internal factors such as ability and effort is necessary.

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## The Effect of Perceived Self-Esteem and Social Support of Nursing Students on Mental Health

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### Abstract---

**Background/Objectives:** This study is conducted in order to acknowledge nursing student's mental health in relation to perceived self-esteem and social support, compare variable's correlation and factors affecting nursing student's mental health.

**Methods/Statistical Analysis:** 316 nursing students from S University in G region, and C University in C region was studied via descriptive research study. The Questionnaire consisted of total 60 questions; 7 questions asking general characteristics of the subject, and 10 questions to measure self-esteem, 25 questions for social support, and 18 questions for mental health. Survey was answered from September 5<sup>th</sup> to 9<sup>th</sup>, 2016 and later analyzed by SPSS Win 20.0 program.

**Findings:** General Characteristics of the subjects were as followed; Age group highest among 30s(44.3%) and 40s(45.1%). More than half of the subjects had high school level of education (55.7%). Monthly income ranging between 2~3 million won (61.5%), self-evaluated their occupational environment as a mid-level (65.6%) and 54.9% a smoker and 40.2% alcohol drinker. Meaning of life scored mean score of 5.09(SD=0.73) out of 1-7 scale, and among the sub-factors, 'Meaning search' was the higher than 'Meaning discovery'. Mean score of 'Attribution Style' was 3.37(SD=0.31) within 1-5 scale, 'Ability' was the highest sub-factor. Mean score of 'Academic Self-Efficacy' scored 3.07(SD=0.41) within 1-5 scale, the 'Self-control Efficacy' was highest sub-factor. All the factors relevant to nursing student's mental health showed pure correlation, which includes Self-esteem and Social Support ( $r=-.354$ ,  $p=.000$ ), Mental Health( $r=.746$ ,  $p=.000$ ), Social Support and Mental Health( $r=.405$ ,  $p=.0001$ ). As a result of multiple regression analysis, Influence factor of nursing student's mental health included Self-esteem, Social support, and Regular sleep (no) in order, having 59.1% explanation power to nursing student's mental health.

**Improvements/Applications:** This study provides fundamental data for nursing intervention to promote nursing student's mental health. Thus further plan to promote nursing student's mental health should also consider 'Self-esteem' and 'Social support'.

**Keywords---** Self-Esteem, Social Support, Nursing Students, Mental Health, Self-Efficacy.

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Special Issue on "Science and Management"

## I. INTRODUCTION

Recently mental health is becoming more serious issue in educational field. Especially because college years are within adolescence period when self-identity is formed, which is most sensitive period to cause drastic change in values<sup>1</sup>, causing more issues, and its more critical with nursing students who appeal more anxiety and stress caused by clinical training<sup>2</sup>. Self-esteem, personal resource that affects mental health, indicates how individual make oneself capable and valuable, higher the self-esteem make the one consider hardship one faces in daily life as an opportunity to change<sup>3</sup>. Also social support as an environmental resource provides a sense of stability and affect psychological adaptation<sup>4</sup>, plays a key factor of indirect coping resource in interpersonal relationship network<sup>5</sup>. Therefore, self-esteem and social support is suggested to affect welfare and health of human being. Thus this study acknowledge effect of nursing student's perceived self-esteem and social support to their mental health, try to provide fundamental data to not only promote nursing student's mental health on their way to professional nursing trainee but also help instructors in educational field.

Concrete object of this study is as followed.

- 1) To understand general characteristic of nursing students.
- 2) To understand nursing student's level of self-esteem, social support, and mental health..
- 3) To compare variable differences according to nursing student's general characteristics.
- 4) To understand correlation between nursing student's mental health related factors.
- 5) To understand factors affecting nursing student's mental health.

## II. METHOD OF STUDY

### A. *Subjects and Data Collection Method*

Subject of this study is random sampling selected 316 nursing students currently attending S college in K region, and C College in C region.

### B. *Tools of study*

The questionnaire of the study consists of total 60 questions; self-esteem 10 questions, social support 25 questions, mental health 18 questions, and general characteristics 7 questions.

**Self-esteem:** The self-esteem scale developed<sup>6</sup> and later translated<sup>7</sup> was used as a tool.

**Social Support:** The social support scale developed<sup>8</sup> and later modified, supplemented<sup>9</sup> was used as a tool.

**Mental Health:** Mental health: A tool of Psychosocial Wellbeing Index-Short Form (PWI-SF) developed<sup>10</sup> was used. The higher the score means the poorer psychosocial wellbeing.

### C. *Data Collection*

Data was collected during September 5<sup>th</sup> to 9<sup>th</sup>, 2016, total 400 surveys were handed out and 332 was turned in. 16 insufficient surveys were excluded and 316 survey paper was used in final analysis.

#### D. Data Analysis

Collected data was analyzed using SPSS Win 20.0 program. Calculated nursing student's self-esteem, social support and mental health level are into average and standard deviation. Correlation of nursing student's self-esteem, social support, and mental health was analyzed using Pearson's Correlation Coefficient. Stepwise Multiple Regression was used to analyze factors affecting nursing student's mental health.

### III. RESULTS

#### A. The General Characteristics of the Subjects

General characteristics of subjects in this study are exactly equate to Table 1. Subjects of this study are total 316 person, whom in grades are 1<sup>st</sup> grader 64 person(20.3%), 2<sup>nd</sup> grader 82 person(25.9%), 3<sup>rd</sup> grader 88 person(27.8%), and 4<sup>th</sup> grader 82 person(25.9%). In age groups, under age 29 being 296 people (94%) account for majority of group, Yes for religion was 121(38.3%) and no was 195(61.7%). Incentives to nursing department were Employment 172 person(54.6%), Recommendation from around 59 person(18.7%), to Realize Humanity 32 person(10.2%) and 52 person(16.5%) checked others. Economic Levels were High 34 person(10.8%), Middle 228 person(72.2%), Low 54 person(17.1%), and Major in other field was 107 person(34.0%), and have not Majored in other fields were 208 person (66.0%). Case of Regular Exercise were 55 person(17.5%), 248 person(78.7%) answered no to Regular Exercise, and 12 person(3.8%) answered others, In case of Regular Sleep was yes 85 person(26.9%), no 229 person(72.5%), and others 2(0.6%).

Table 1: The General Characteristics

(N=316)

Characteristics	Categories	N(%)
Grade	1st	64(20.3)
	2nd	82(25.9)
	3rd	88(27.8)
	4th	82(25.9)
Age	under 29	296(94.0)
	Age 30-39	13(4.1)
	Age 40-49	4(1.3)
	Age 50-59	2(0.6)
Religion	Yes	121(38.3)
	No	195(61.7)
Incentives to admissions	Employment	172(54.6)
	Recommendation	59(18.7)
	Realize Humanity	32(10.2)
	Others	52(16.5)
Economic level	High	34(10.8)
	Medium	228(72.2)
	Low	54(17.1)
Transfer student	Yes	107(34.0)
	No	208(66.0)
Regular movement	Yes	55(17.5)
	No	248(78.7)
	Others	12(3.8)
Regular sleep( $\geq 5$ /day)	Yes	85(26.9)
	No	229(72.5)
	Others	2(0.6)

**B. Extents of Self-Esteem, Social Support, and Mental Health of Nursing Students**

Nursing student’s self-esteem, social support, and mental health are appear to the following Table 2 below. Looking closely, mean score of self-esteem was 3.47(SD=0.59) out of 1-5 point range, mean score of social support was 3.91(SD=0.68) from 1-5 point range, lastly mean score of academic mental health scored 3.32(SD=0.59) from 1-5 point range.

Table 2: Extents of Self-Esteem, Social Support, and Mental Health of Nursing Students

(N= 316)

Variables	Range	Mean	SD	Min-Max
Self-esteem	10-50	34.70	5.93	18-49
Social support	25-125	97.77	16.96	25-125
Mental health	18-90	59.82	10.68	30-88

**C. Difference between Nursing Student’s Self-Esteem, Social Support, and Mental Health According to Nursing Student’s General Characteristic**

Difference between nursing student’s self-esteem, social support, and mental health according to nursing student’s general characteristic health are appear to the following Table 3 below.

Analyzing 3 variable’s difference according to general characteristic of nursing student, self-esteem showed meaningful difference only in regular physical activity(F=4.987, p=.007), social support in economical level (F=8.812, p=.0001), and mental health showed meaningful difference in regular sleeping pattern(F=4.634, p=.010) and economical level (F=3.563, p=.030).

Table 3: Difference in Self-Esteem, Social Support, and Mental health according to General Characteristics

(N=316)

Characteristics	classification	Self-esteem		Social Support		Mental Health	
		M±SD	t or F(p)	M±SD	t or F(p)	M±SD	t or F(p)
Age (years)*	Under 29	34.64±5.79	.687 (.561)	97.91±16.17	.248 (.863)	59.75±10.36	.632 (.595)
	30-39	36.85±8.70		94.31±28.59		62.54±16.85	
	40-49	33.25±2.22		101.25±29.78		55.00±10.95	
	50-59	36.00±11.31		99.50±24.75		63.50±16.26	
Grade	1st	34.38±5.05	1.043 (.374)	97.95±16.47	.053 (.984)	61.61±8.95	2.137 (.095)
	2nd	35.26±6.04		98.28±17.17		60.84±11.33	
	3rd	33.92±5.89		97.28±17.37		57.60±9.42	
	4th	35.24±6.46		97.63±16.96		59.79±12.20	
Religion*	Yes	35.02±5.81	.761 (.447)	98.75±16.43	.811 (.418)	60.87±10.74	1.372 (.171)
	No	34.50±6.00		97.16±17.29		59.17±10.62	
Transfer student	Yes	34.42±6.92	-.531 (.596)	97.09±18.91	-.503 (.615)	59.27±11.56	-.594 (.553)
	No	34.83±5.36		98.11±15.95		60.02±10.18	
Regular Exercise	Yes	36.78±5.93	4.987 (.007)	99.00±16.62	2.194 (.113)	62.51±10.40	2.801 (.062)
	No et cetera	34.34±5.78 32.25±7.02		97.04±17.16 107.08±12.43		59.34±10.57 56.00±11.86	
Regular Sleep	Yes	34.98±5.60	1.125 (.326)	98.58±17.78	.329 (.720)	62.34±9.84	4.634 (.010)
	No et cetera	34.55±6.02 40.50±9.19		97.41±16.73 105.00±7.07		58.79±10.82 71.00±9.90	
Incentives to Admission	Employment	34.16±5.44	1.820 (.143)	95.53±16.56	2.372 (.070)	59.15±10.38	1.166 (.323)
	Recommendations	34.51±6.38		99.32±18.21		59.17±11.39	
	Realize Humanity et cetera	35.53±5.87 36.19±6.84		101.16±13.22 101.33±18.26		61.00±9.45 62.02±11.55	
	Economic Level	High	36.15±6.15	2.154 (.118)	105.09±14.38	8.812 (.000)	63.71±11.36
	Mid	34.77±5.79		98.42±16.33		59.79±10.46	
	Low	33.50±6.22		90.43±18.62		57.52±10.65	

**D. Correlation of Nursing Student's Self-Esteem, Social Support, and Mental Health**

Correlation between each key variables are Table 4 below. Within correlation of relevant factors of student's mental health, self-esteem and social support( $r=.354, p=.000$ ), self-esteem and mental health( $r=.746, p=.000$ ), social support and mental health( $r=.405, p=.000$ ) all showed pure correlation.

Table 4: Relationships between the Self-Esteem, Social Support, and Mental Health (N=316)

Variables	Self-esteem	Social support	Mental health
	r(p)	r(p)	r(p)
Self-esteem	1		
Social support	.354(.000)	1	
Mental health	.746(.000)	.405(.000)	1

**E. Factors affecting nursing student's mental health**

To identify influential factor of study subject's Mental Health, Multiple Regression Analysis was conducted with variables within General Characteristic which showed significant differences with Mental health set as a predictor. Nominal scale was analyzed by variable number processing, VIF and Dubin-Watson values were used to verify multicollinearity or correlation between residuals then stepwise multiple regression analysis was conducted table 5. As a result of multiple regression analysis, nursing student's mental health relevant influence factors include, self-esteem to mental health( $\beta=.685, p=.001$ ), followed by social support( $\beta=.158, p<.001$ ), regular sleeping pattern (No)( $\beta=-.123, p=.001$ ) showed relations, and these variables explanation power 59.1% of mental health of nursing students.

Table 5: Influencing Factors of Mental Health (N=316)

Variables	B	SE	$\beta$	t	p
Academic self-efficacy	9.376	2.847		3.294	.001
	1.235	0.069	0.685	17.775	<.001
	0.099	0.024	0.158	4.091	<.001
	-2.936	0.861	-0.123	-3.408	.001
R <sup>2</sup> =.595, Adjusted R <sup>2</sup> =.591, F=11.615, p=.001, VIF=1.002~1.144, Durbin-Watson=1.962					

\*Dummy variables : Reference group : Regular sleep : Yes

**IV. DISCUSSION**

Nursing students faces more hardship over professional adaptation because they should perform clinical practice while learning and also due to high level of responsibility upon patients, and relatively strict tradition and rules. Researches<sup>11</sup> claimed that female students major in nurse have more stress and adaptation problem compare to female students major in literature, nursing students experience severe stress, anxiety, and dissatisfaction from nursing education itself, but because they are close to sick patient causes more severe stress. Self-esteem and social support can affect how individual perceive their stress and cope with it, and act as a protective factor to self-evaluate oneself in stressful condition positively, making changes in individual's physical, psychological adaptation result<sup>12</sup>. In this research, factors especially affecting nursing student's

mental health include self-esteem, social support, and regular sleeping pattern showing meaningful effect, thus It is necessary to reassure factors affecting mental health through repeated study, and develop education and programs to promote mental health of nursing students under overload of carrying out theoretical and clinical practices.

## V. CONCLUSION AND SUGGESTIONS

We should concern more about self-esteem, social support which appeared to be affecting nursing students' mental health. Consider self-esteem and social support which has meaningful affect to nursing students' mental health, and developing health promoting program that able regular sleeping pattern is required, and we suggest repeated study to enhance nursing students' mental health whose more stressful compare to students in other major.

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## The Influence of Self-Respect and Attributional Tendency on Career Decision Self-Efficiency of the Nursing Student

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### Abstract---

**Background/Objectives:** Our study focuses on identifying the correlation between self-respect, attributional tendency, career decision self-efficiency, and other relevant factors for nursing student.

**Methods/Statistical analysis:** Subjects of 243 students were selected for descriptive survey from C University in C city. Data were collected using a questionnaire from August 29, 2016 to September 2, 2016. Data analysis was done using SPSS WIN 21.0 program. Pearson's correlation coefficient was used for the relations of self-respect, attributional tendency, for student. Stepwise Multiple Regression was used for the influencing factor on career decision self-efficiency for student.

**Findings:** Regarding the relation between the relevant factors of career decision self-efficiency of the nursing student, self-respect and ability factor of attributional tendency ( $r=.303, p<.05$ ), self-respect and effort factor of attributional tendency ( $r=.307, p<.01$ ), self-respect and career decision self-efficiency ( $r=.541, p<.01$ ), ability factor of attributional tendency and career decision self-efficiency ( $r=.431, p<.01$ ), effort factor of attributional tendency and career decision self-efficiency ( $r=.407, p<.01$ ) showed pure correlation. On the other hand, self-respect and others factor of attributional tendency ( $r=-.269, p<.01$ ), self-respect and luck factor of attributional tendency ( $r=-.340, p<.01$ ), others factor of attributional tendency and career decision self-efficiency ( $r=-.128, p<.05$ ), luck factor of attributional tendency and career decision self-efficiency ( $r=-.165, p<.05$ ) respectively showed inverse correlation. As for the factors influencing the career decision self-efficiency of the nursing student, the multiple regression analysis revealed that factors were arranged in order of importance like self-respect ( $\beta=.447, p<.001$ ), ability factor ( $\beta=.239, p<.001$ ), effort factor ( $\beta=.134, p<.001$ ), luck factor ( $\beta=.021, p<.001$ ), and others factor ( $\beta=.008, p<.001$ ) which are sub factors of attributional tendency. These variables explained 36.6% of the career decision self-efficiency.

**Improvements/Applications:** In the future, variables including perceived self-respect and attributional tendency should be considered to use the positive and effective coping for improving the career decision self-efficiency of the nursing student.

**Key words---** Self-Respect, Attributional Tendency, Career Decision Self-efficiency, Nursing Student.

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## **I. INTRODUCTION**

Being very important for university student, career decision making and employment causes considerable stress on them <sup>1</sup>. Most students in university seriously concern over their future and make thorough preparations for their career <sup>2</sup>, so it is desirable to help them efficiently decide where to go and what to do <sup>3</sup>. In particular, rather high employment rates might make nursing student consider their career insufficient however career decision making becomes the main concern in graduation time <sup>4</sup>. These anxieties about career decision making can lead the nursing student onto a hasty decision bringing in the situation that 69% of new nurses hope to change jobs within the first year <sup>4</sup>.

This situation brings about lowering the quality of nursing service as well as loss of medical manpower which has been trained for a long time. In this way when nursing student decide to become nurses, lacking in sufficient deliberation on career decision making based on understanding of themselves, they fail to satisfy with occupation <sup>5</sup>. Therefore it is highly recommended to increase career decision self-efficiency in order to actively prepare for career in which nursing student will effectively perform varied tasks as professional nurses.

Looking into the influence of perceived self-respect and attributional tendency on career decision self-efficiency to set up a positive self-respect and perceive intrinsic and extrinsic attributional tendency, our study focuses on developing a positive and efficient coping mechanism to increase career decision self-efficiency as well as providing fundamental data useful for career education and vocational guidance for nursing student.

The objectives of our research are to identify the relation between career decision self-efficiency and related factors for nursing student and the factors affecting career decision self-efficiency for nursing student, and detail of the purpose is right below this paragraph.

- 1) Identify the degree of self-respect, attributional tendency and career decision self-efficiency for nursing student.
- 2) Identify the relation between career decision self-efficiency and related factors for nursing student.
- 3) Identify the factors affecting career decision self-efficiency for nursing student.

## **II. METHODS**

### ***A. Sampling and Data Acquisition Method***

In our research, a random sampling method was used to select 243 nursing student C University in C city.

### ***B. Tools of Study***

**Self-respect:** Developed <sup>6</sup> and later translated <sup>7</sup> as a tool, the self-esteem scale was used.

**Attributional tendency:** Developed <sup>8</sup> and later translated <sup>9</sup> as a tool, the Attributional style scale was used.

**Career decision self-efficiency:** Developed <sup>10</sup> and later translated <sup>11</sup> as a tool, the Career Decision making Self efficacy Scale-Short Form: CDMSES-SF was used.

### **C. Data Collection of Survey**

Survey data were collected using questionnaire from August 29, 2016 to September 2, 2016. A total of 253 questionnaires were distributed, 249 copies were collected, and 243 copies were used for the final data analysis except for 6 copies with insufficient data analysis.

### **D. Statistical Analysis**

Data analysis was done using SPSS WIN 21.0 program. Extent of self-respect, attributional tendency and career decision self-efficiency for nursing student was obtained using the mean and standard deviation. Pearson's correlation coefficient was used for the relations of self-respect, attributional tendency related career decision self-efficiency for nursing student.

Stepwise Multiple Regression was used for the influencing factor on career decision self-efficiency for nursing student.

## **III. RESULTS OF STUDY**

### **A. The General Characteristics**

General characteristics in our study are exactly equate to [Table 1]. Subjects of our study are total 316 person, whom in grades are 1<sup>st</sup> grader 79 person(32.5%), 2<sup>nd</sup> grader 76 person(31.3.9%), 3<sup>rd</sup> grader 69 person(28.4%), and 4<sup>th</sup> grader 19 person(7.8%).

In age groups, under age 29 being 230 people (94.7%) account for majority of group, Yes for religion was 164(67.5%) and no was 79(32.5%).

Incentives to nursing department were Employment 125 person (51.4%), Recommendation from around 40 person (16.5%), to Realize Humanity 33 person (13.6%) and 45 person (18.5%) checked others. Economic Levels were High 27 person(11.1%), Middle 179 person(73.7%), Low 37 person(15.2%), and Major in other field was 72 person(29.6%), and have not Majored in other fields were 171 person (70.4%). Case of Regular Exercise were 46 person (18.9%), 186 person(76.5%) answered no to Regular Exercise, and 11 person (4.5%) answered others, In case of Regular Sleep was yes 78 person(32.1%), no 165 person(67.9%), and others 0(0%).

Table 1: The General Characteristics  
(N=243)

Characteristics	Categories	N(%)
Grade	1st	79(32.5)
	2nd	76(31.3)
	3rd	69(28.4)
	4th	19(7.8)
Age	under 29	230(94.7)
	30-39	9(3.7)
	40-49	2(0.8)
	50-59	2(0.8)
Religion	Yes	164(67.5)
	No	79(32.5)
Incentives to admissions	Employment	125(51.4)
	Recommendation	40(16.5)
	Realize Humanity	33(13.6)
	Others	45(18.5)
Economic level	High	27(11.1)
	Medium	179(73.7)
	Low	37(15.2)
Transfer student	Yes	72(29.6)
	No	171(70.4)
Regular movement	Yes	46(18.9)
	No	186(76.5)
	Others	11(4.5)
Regular sleep( $\geq 5$ /day)	Yes	78(32.1)
	No	165(67.9)
	Others	0(0)

**B. Extent of Self-Respect, Attributional Tendency and Career Decision Self-Efficiency for Nursing Student**

The self-respect, attributional tendency and career decision self-efficiency are appear to the following [Table 2] below. Nursing student showed  $3.54 \pm 0.57$  points out of the range of 1-5 points in self-respect;  $3.37 \pm 0.31$  out of the range of 1-5 points in attributional tendency;  $3.51 \pm 10.48$  points out of the range of 1-5 points in career decision self-efficiency.

Table 2: Extents of Self-Respect, Attributional Tendency and Career Decision Self-Efficiency

Categories		Mean $\pm$ SD
Self-respect		35.41 $\pm$ 5.725
Attributional tendency	Ability	29.17 $\pm$ 3.777
	Effort	26.87 $\pm$ 3.766
	Others	22.52 $\pm$ 4.246
	Luck	25.39 $\pm$ 4.788
	Total attributional tendency	107.78 $\pm$ 10.065
Career decision self-efficiency	Collection of job information	17.76 $\pm$ 2.749
	Establishment of target	17.86 $\pm$ 2.753
	Planning	17.13 $\pm$ 2.826
	Problem solution	16.89 $\pm$ 2.998
	Self-evaluation	18.05 $\pm$ 2.635
	Total career decision self-efficiency	87.71 $\pm$ 12.035

**C. Relations Among Self-Respect, Attributional Tendency and Career Decision Self-Efficiency for Nursing Student**

Correlation between each key figure are [Table 3] below.

As for the relation between factors related to career decision self-efficiency for nursing student self-respect and ability factor of attributional tendency( $r=.303$ ,  $p<.05$ ), self-respect and effort factor of attributional tendency( $r=.307$ ,  $p<.01$ ), self-respect and career decision self-efficiency ( $r=.541$ ,  $p<.01$ ), ability factor of attributional tendency and career decision self-efficiency( $r=.431$ ,  $p<.01$ ), effort factor of attributional tendency and career decision self-efficiency( $r=.407$ ,  $p<.01$ ) showed pure correlation and self-respect and others factor of attributional tendency( $r=-.269$ ,  $p<.01$ ), self-respect and luck factor of attributional tendency( $r=-.340$ ,  $p<.01$ ), others factor of attributional tendency and career decision self-efficiency( $r=-.128$ ,  $p<.05$ ), luck factor of attributional tendency and career decision self-efficiency( $r=-.165$ ,  $p<.05$ ) showed inverse correlation.

Table 3: Relations Among Self-Respect, Attributional Tendency and Career Decision Self-Efficiency

Variables		Self -respect r	Attributional tendency					Career decision self-efficiency R
			Ability r	Effort r	Others r	Luck r	Total r	
Self-respect		1.000	.303*	.037**	-.269**	-.340**	-.035	.541*
Attributional tendency	Ability	.303*	1.000	.701**	.005	-.052	.651**	.431**
	Effort	.037**	.701**	1.000	-.214**	-.207**	.494**	.407**
	Others	-.269**	.005	-.214**	1.000	.580**	.610**	-.128*
	Luck	-.340**	-.052	-.207**	.580**	1.000	.609**	-.165*
	Total	-.035	.651**	.494**	.610**	.609**	1.000	.200**
Career decision self-efficiency		.541*	.431**	.407**	-.128*	-.165*	.200**	1.000

\*  $P<0.05$ , \*\*  $P<0.01$ , \*\*\*  $P<0.001$

**D. Factors Influencing Self-Respect, Attributional Tendency and Career Decision Self-Efficiency for Nursing Student**

As for the factors influencing the for career decision self-efficiency of the nursing student, the multiple regression analysis revealed that factors were arranged in order of importance like self-respect( $\beta=.447$ ,  $p<.001$ ), ability factor( $\beta=.239$ ,  $p<.001$ ), effort factor( $\beta=.134$ ,  $p<.001$ ), luck factor( $\beta=.021$ ,  $p<.001$ ), and others factor( $\beta=.008$ ,  $p<.001$ ) which are sub factors of attributional tendency. These variables explained 36.6% of the career decision self-efficiency[Table 4].

Table 4: Factors Influencing Self-Respect, Attributional Tendency and Career Decision Self-Efficiency

Independent variables	B	$\beta$	t	AdjR <sup>2</sup>	F	
Self-respect	.940	.447	7.777	.366	29.000***	
Attributional tendency	Ability	.648	.239			2.712
	Effort	.427	.134			1.767
	Others	.022	.008			.121
	Luck	.053	.021			.323

\*\*\*  $P<0.001$

#### **IV. DISCUSSION**

The objective of our study was to identify perceived self-respect and attributional tendency affecting career decision self-efficiency for nursing student. For this, survey research was conducted from C University in C city, applying the Pearson's correlation coefficient and multiple regression analysis.

First, the degree of self-respect, attributional tendency, and career decision self-efficiency was perceived above average.

Second, among self-respect and sub factors of attributional tendency, ability factor and effort factor showed pure correlation while others factor and luck factors showed inverse correlation. This means that student with higher self-respect tend to attribute success to their ability and effort, and inversely student, who more attribute success to their ability and effort, tend to have higher self-respect. Among sub factors of attributional tendency, ability factor, effort factor, and career decision self-efficiency showed pure correlation while others factor and luck factors showed inverse correlation. This means that the more student attribute success to their ability and effort, the higher they have decision making self-efficiency. It seems similar to the study result <sup>12</sup> of Lee Hae-Kyoung (2013) which concluded there is the substantial correlation between self-respect and decision making self-efficiency and the study result <sup>13</sup> of Choi Young-Hee (2004) which concluded there is the significant correlation between degree of effort attribution and decision making self-efficiency. Therefore it is required to develop and apply diverse tests and programs that help student take the lead at the career decision making by developing diagnostic method for career and moreover selecting a curriculum subject appropriate for career <sup>13</sup>.

Third, as for the factors influencing the for career decision self-efficiency of the nursing student, the multiple regression analysis showed that in order of importance were revealed self-respect, ability factor, effort factor, luck factor, others factor which sub factors of attributional tendency. These variables explained 36.6% of the career decision self-efficiency.

Among the factors influencing the career decision self-efficiency of the nursing student, self-respect appeared to be the most significant. Thus, the development of interventions is needed for managing and improving self-respect of the nursing student. In addition, development of systematic career education and vocational guidance programs is needed to improve the career decision self-efficiency of the nursing student.

#### **V. CONCLUSION**

Taking into account the confirmed fact that self-respect and attributional tendency can influence career decision self-efficiency of the nursing student, systematic career education and vocational guidance programs need to be developed.

Thus, more studies should be followed to identify the relation between self-respect, attributional tendency and career decision self-efficiency of the nursing student. In addition, researches are suggested in the future to improve the career decision self-efficiency of the nursing student.

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# The Influence of Mental Health, Emotional Intelligence, and Self-directed Learning Ability on Interpersonal Relationships among Nursing Students

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## Abstract---

**Background/Objectives:** The present study was a descriptive correlational study designed to examine the relations among mental health, emotional intelligence, and self-directed learning ability on interpersonal relationships in nursing students.

**Methods/Statistical Analysis:** The study was conducted between March 2 and June 7, 2016, during which time the content of the study was explained and questionnaires were completed. Mental health, emotional intelligence, self-directed learning ability, and interpersonal relationship were analyzed using Pearson's correlation coefficient. Linear regression was used to determine the factors influencing interpersonal relationships in nursing students.

**Findings:** Nursing students' interpersonal relationships were significantly correlated with self-directed learning ability( $r=.50$ ,  $p<.01$ ), mental health( $r=-.38$ ,  $p<.01$ ), and emotional intelligence( $r=.21$ ,  $p<.05$ ). Self-directed learning ability and emotional intelligence( $r=.29$ ,  $p<.01$ ) were also significantly correlated. Self-directed learning ability and mental health were factors significantly influencing interpersonal relationship for these students, and they had an explanatory power of 33.0% for interpersonal relationships.

**Improvements/Applications:** The findings can be used as basic data to develop nursing education programs with the mental health and self-directed learning ability considered to improve interpersonal relationship ability of nursing students.

**Keywords---** Mental Health, Emotional Intelligence, Self-Directed Learning Ability, Interpersonal Relationships, Nursing Students.

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## I. INTRODUCTION

College students experience various relationships as they are exposed to the new college environment, and it is the period when the scope of interpersonal relationships increases rapidly and students go through the process of becoming an adult as they form meaningful relationships with important others<sup>1</sup>. Satisfactory and effective interpersonal experiences positively influence an individual to develop a sound personality and form an identity, but unsatisfactory and ineffective interpersonal relationships become the source of mental illness, create frustration and fear, and reduce self-confidence and self-esteem resulting in inability to handle anything successfully and having a sense of inferiority<sup>2</sup>. In particular, the development of interpersonal relationship of nursing students is very important because nursing as a profession centers on human relationships. Nurses have to establish helping relationships with various classes of patients, satisfy their needs, and form an amicable relationship.

The variables that affect the interpersonal relationships of college students reported in previous studies were self-esteem<sup>3</sup>, empathic ability<sup>4</sup>, mental health<sup>5</sup>, self-efficacy<sup>6</sup>, and communication ability<sup>7</sup>. Among those, mentally healthy people are reported to form satisfaction and understanding of each other through amicable communication in interpersonal relationships<sup>8</sup>, and mental health can be considered very important for the processes to improve efficiency, satisfaction, and sense of success as a human being and for efficient and effective social functions. It is necessary, however, to analyze in-depth the relationship between mental health and interpersonal relationship ability because the research related to mental health so far has focused on the relationship between mental health of adolescents and attitude toward school life<sup>9</sup>, on self-concept of nursing students and mental health<sup>10</sup>, and the relationship between the level of the meaning of life and self-esteem, interpersonal relationships, social support, and mental health in college students taking a psychology course<sup>11</sup>.

In addition, humans form many social relationships with others in various social situations, and they need not only various cognitive abilities but also the ability to understand emotions to maintain social relationships well. The understanding and expression of emotions is very useful for resolving interpersonal conflicts because if one understands one's emotions well and expresses them, mutual understanding will improve by receiving feedback from others on the emotions one expressed, and better understand the cause and effect relationships between events and emotions<sup>12</sup>. Goleman<sup>13</sup> contended that the success and adaptation in most human relations are influenced by emotional intelligence, and Campos et al.<sup>14</sup> stated that emotions play a crucial role in interpersonal relationships. Despite the fact that emotional intelligence is a major variable that affects interpersonal relationships, most studies have focused on elementary, middle, and high school students<sup>15-17</sup>, and studies on its relationship with interpersonal relationships in nursing students are lacking.

On the other hand, because adolescents have the desire for not only academic achievement but also relationships such as a sense of belonging or pursuit of intimacy, relationship factors also need to be investigated to support development during adolescence<sup>18</sup>. Tangney et al.<sup>19</sup> stated that adolescents with a high degree of self-control and adjustment over their thoughts, emotions, impulses, academic performance, and habits have a high possibility of developing positive interpersonal skills or levels, and are able to show stable attachment or appropriate emotional responses to others. That is, high self-control ability or overall life control ability indicates that one can be positive in performing social functions such as interpersonal relationships and helps with harmonious interactions by preventing risk factors for relationships in advance. As the existing research on self-directed learning<sup>20-23</sup> has mostly investigated relationships with performance aspects such as school grades, it is necessary to expand the scope of interest to interpersonal relationships. In fact, it was found that the higher the degree of self-directedness in learning, the higher the degree of peer relationships and relationships with teachers in a study that investigated the structural relationships among self-directedness, self-esteem, academic achievement, and interpersonal relationships in school among middle school students<sup>18</sup>.

Accordingly, the present study investigated the degree of and the relationship among mental health, emotional intelligence, and self-directed learning ability of nursing students that can affect interpersonal relationship ability. The results may provide the basic data necessary to build educational material for the successful development of interpersonal ability of nursing students in the future.

## **II. MATERIALS AND METHODS**

### **A. Study Design**

The present study was a descriptive correlational study designed to examine the relations among mental health, emotional intelligence, self-directed learning ability, and interpersonal relationship in nursing students.

### **B. Participants**

Participants in this study were 113 junior students from a nursing department of 2 different universities based in D city. The study was conducted between March 2 and June 7, 2016, during which time the content of the study was explained and questionnaires were completed. The sample size was calculated using G\*Power 3.1.9.2<sup>24</sup>. Based on linear multiple regressions with an effect size of .35, significance level of .05, and power of test of .95, the calculated sample size was larger than the recommended size of 80; thus, it satisfied the requirement. Out of 113 questionnaires, those with unreliable answers or missing data for main assessment variables were excluded. A total of 109 questionnaires (96.4%) were utilized for final analysis.

### **C. Instruments**

#### ***Mental Health***

The General Health Questionnaire (GHQ) is a self-report inventory developed by Goldberg and Hillier<sup>25</sup> for discrimination and early detection of mental illnesses in normal adults. The inventory asks respondents on how their psychological state changed over the last 2 to 3 weeks compared to the usual state when they feel normal in order to detect problems in their current state. It originally consisted of 60 questions, but our study used the simplified version with 12 questions translated by Park et al.<sup>26</sup>. The GHQ-12 has a structure consisting of 2 factors, "depression and anxiety" and "social dysfunction." A higher score indicates stronger psychological distress.

In this study, a Likert scale was applied to test the factor structure of the GHQ-12, and the affirmative questions (questions 1,3,4,7, and 12) were inversely scored. In a study by Picardiet al.<sup>27</sup>, the test-retest reliability at one-week interval was 0.72, and Cronbach's  $\alpha$  was .88. The Cronbach's  $\alpha$  in this study was .71.

#### ***Emotional Intelligence***

Emotional intelligence was measured using 20 questions in the checklist by Moon<sup>28</sup>. This tool is a self-report test on situation-based performance developed for adults and consists of emotional perception, emotional expression, empathy, emotional regulation, and emotional utilization. For all questions, one option should be chosen out of 4. Each option has different points assigned from 0, 5, 10, and 20 points, and each question has a different scoring criterion. A higher total score indicates higher emotional intelligence. A score of 204 was considered low, 205–264 moderate, 265–309 high, and 310 or higher to be very high. Cronbach's  $\alpha$  for each sub domain was presented in Moon's study as follows:  $\alpha = .75$  for emotional perception,  $\alpha = .77$  for emotional expression,  $\alpha = .80$  for empathy,  $\alpha = .76$  for emotional utilization, and  $\alpha = .85$  for emotional regulation<sup>28</sup>.

#### ***Self-Directed Learning Ability***

The instrument developed by the Korean Educational Development Institute<sup>29</sup> was used. A total of 40 questions range between 40–200 points, based on a 5-point Likert scale, and higher scores indicate better self-directed learning ability. The Cronbach's  $\alpha$  at the time of development was .92 and it was .90 in this study.

#### ***Interpersonal Relationship***

For the questionnaire, the Relationship Change Scale by Schlein and Guerney<sup>30</sup>, which had been adapted to the Korean environment by Moon<sup>31</sup> was used. A 5-point Likert scale was applied to a total of 25 questions, with a score range of 25–125 points, where higher scores indicated better interpersonal relationships. The Cronbach's  $\alpha$  of the tool was .88 in the study in which it was developed, and was .93 in the present study.

#### ***Statistical Analysis***

Data were analyzed using SPSS/WIN 21.1.

- 1) The general characteristics of the participants were analyzed using descriptive statistics.
- 2) Mental health, emotional intelligence, self-directed learning ability, and interpersonal relationship were analyzed using Pearson's Correlation Coefficient.
- 3) Linear regression was used to determine the factors influencing interpersonal relationship in nursing students.

### III. RESULTS AND DISCUSSION

#### A. General Characteristics of the Participants

The general characteristics of the participants were as follows: 66 participants were under 21 years old (60.6%), 43 were over 22 years old (39.4%), and the number of female participants was 96 (88.1%). In terms of religion, 73 people had none (67.0%) as shown in Table 1.

Table 1: The General Characteristics of the Participants

(N = 109)

Characteristics	Categories	N(%)	Mean(SD)
Age(year)	19-20	44(40.3)	22.06(3.28)
	21-22	35(32.1)	
	23-24	15(13.8)	
	25-30	12(11.1)	
	31-40	3(2.7)	
Gender	Male	13(11.9)	
	Female	96(88.1)	
Religion	None	73(67.0)	
	Protestant	21(19.3)	
	Buddhism	6(5.5)	
	Catholic	4(3.7)	
	Others	5(4.6)	
Motivation of admission	Employment	47(43.1)	
	Advice of people	22(20.2)	
	Aptitude	21(19.3)	
	School grades	10(9.2)	
	Spirit of service	4(3.7)	
	Others	5(4.6)	
Satisfaction with major	Satisfied	56(51.4)	
	Usually	44(40.4)	
	Unsatisfied	9(8.2)	

#### B. Mean of Variables

The average mental health of nursing students was 25.41(4.12); average emotional intelligence was 202.57(43.82); average self-directed learning ability was 135.10(16.25); and average interpersonal relationship was 88.26(12.34) as shown in Table 2.

Table 2: Mean of Variables

(N = 109)

Variable	Mean(SD)	Min -Max
Mental Health	25.41(4.12)	15.0 - 35.0
Emotional Intelligence	202.57(43.82)	100.0 - 310.0
Self-directed Learning Activity	135.10(16.25)	98.0 - 174.0
Interpersonal Relationship	88.26(12.34)	58.0 - 124.0

The average emotional intelligence of nursing students belonged to the low level as shown in Table 3.

**Table 3: The Level of Emotional Intelligence (N = 109)**

Variable	Categories	N(%)	Mean(SD)
Emotional Intelligence	-204	53(48.6)	202.57 (43.82)
	205-264	46(42.2)	
	265-309	9(8.3)	
	310-	1(0.9)	

**C. Variables According to General Characteristics**

Differences were found in mental health ( $F = 4.08, p = .020$ ), self-directed learning ability ( $F = 5.92, p = .004$ ), and interpersonal relationship ( $F = 5.02, p = .008$ ) according to the level of satisfaction with major. As shown in Table 4, mental health, self-directed learning ability, and interpersonal relationship were found to be higher in the group with high level of satisfaction with major than the group with average level of satisfaction with major.

**Table 4: Mental Health, Emotional Intelligence, Self-Directed Learning Ability, and Interpersonal Relationship According to General Characteristics (N = 109)**

Characteristics	Categories	Mental Health			Emotional Intelligence			Self-directed Learning Ability			Interpersonal Relationship		
Characteristics	Categories	Mean (SD)	t or F(p)	Scheffe	Mean (SD)	t or F(p)	Scheffe	Mean (SD)	t or F(p)	Scheffe	Mean (SD)	t or F(p)	Scheffe
Age (in years)	19-20 <sup>a</sup>	25.6 (4.20)	0.26(0.901)		194.5 (44.91)	1.44 (0.226)		133.8 (16.85)	0.70 (0.592)		89.1 (12.63)	0.47 (0.758)	
	21-22 <sup>b</sup>	24.9 (4.67)			213.3 (40.51)			133.8 (14.46)			88.8 (13.61)		
	23-24 <sup>c</sup>	25.9 (4.14)			201.0(3 9.70)			137.4 (18.83)			87.8 (11.53)		
	25-30 <sup>d</sup>	25.8 (2.55)			210.8 (47.90)			141.6 (17.02)			86.1 (9.71)		
	31-40 <sup>e</sup>	24.7 (1.53)			170.0 (57.66)			131.7(1 2.34)			80.3 (7.09)		
Gender	Male	24.2 (3.22)	1.22(0.273)		216.5(3 7.38)	1.51 (0.222)		135.6 (18.55)	0.02 (0.904)		92.1 (12.18)	1.42 (0.236)	
	Female	25.6 (4.22)			200.7 (44.45)			135.0 (16.02)			87.7 (12.34)		
Religion	None <sup>a</sup>	25.5 (4.17)	1.21(0.313)		202.7 (43.52)	1.07 (0.376)		135.0 (17.24)	0.12 (0.975)		88.6 (12.19)	0.23 (0.920)	
	Protestant <sup>b</sup>	24.1 (4.22)			209.3 (39.66)			134.6 (13.17)			88.8 (13.17)		
	Buddhism <sup>c</sup>	27.5 (5.07)			223.8 (41.31)			137.5 (16.05)			83.3 (8.54)		
	Catholic <sup>d</sup>	26.2 (3.19)			187.5(5 9.90)			138.5 (19.09)			86.2 (13.72)		
	Others <sup>e</sup>	27.6 (2.30)			174.0 (45.61)			132.6 (15.22)			87.4 (15.71)		
Motivation of Admission	Employment <sup>a</sup>	25.1 (4.53)	2.13(0.068)		190.0 (39.93)	0.57 (0.723)		132.9 (14.72)	0.28 (0.921)		88.3 (4.00)	0.62 (0.683)	
	Advice of people <sup>b</sup>	25.1 (3.94)			204.3 (50.17)			133.9 (15.69)			88.3(1 6.24)		
	Aptitude <sup>c</sup>	22.8 (2.22)			226.3 (30.10)			142.3 (13.94)			96.5 (18.16)		
	School grades <sup>d</sup>	24.2 (4.17)			205.0 (43.07)			136.6 (15.81)			89.7 (10.30)		
	Spirit of service <sup>e</sup>	25.9 (3.99)			203.2 (44.45)			135.2 (18.07)			87.4 (12.22)		
	Others <sup>f</sup>	29.8 (3.83)			185.0 (31.22)			131.8 (10.31)			83.0 (8.77)		
	Satisfaction with Major	Satisfied <sup>a</sup>			24.4 (4.04)			4.08(0.020)*			a<b		
Usually <sup>b</sup>		26.6 (3.98)	193.4 (38.11)	129.9 (16.27)	83.9 (10.99)								
Unsatisfied <sup>c</sup>		26.0 (3.97)	204.4 (44.26)	129.4 (12.15)	89.6 (19.33)								

\*\* :  $p < .01$ , \* :  $p < .05$

**D. Correlation Analysis**

Nursing students' interpersonal relationship was significantly correlated with self-directed learning ability( $r=.50, p<.01$ ), mental health( $r=-.38, p<.01$ ), and emotional intelligence( $r=.21, p<.05$ ). Self-directed learning ability and emotional intelligence( $r=.29, p<.01$ ) were also significantly correlated as shown in Table 5.

Table 5: Correlations Among Variables

(N = 109)

Variables	1) r(p)	2) r(p)	3) r(p)	4) r(p)
Mental Health <sup>1)</sup>	1			
Emotional Intelligence <sup>2)</sup>	-.14(.149)	1		
Self-directed Learning Ability <sup>3)</sup>	-.17(.086)	.29(.002)**	1	
Interpersonal Relationship <sup>4)</sup>	-.38(.000)**	.21(.029)*	.50(.000)**	1

\*\* : p < .01, \* : p < .05

**E. Regression Analysis**

The Durbin-Watson statistic was 1.86, which was close to 2, and there was no autocorrelation of the error terms. The correlation between independent variables was 0.8 or lower. The variance inflation factor (VIF) was 1.028, not exceeding 10. Therefore, there was no multicollinearity between the independent variables.

To identify the explanatory power of factors related to interpersonal relationship, a linear regression analysis was conducted with interpersonal relationship as the dependent variable, and with mental health, emotional intelligence, and self-directed learning ability as the independent variables.

Mental health ( $\beta = -.31, p < .001$ ) and self-directed learning ability ( $\beta = .45, p < .001$ ) each had a significant influence on interpersonal relationship, with an explanatory power of 33.0% as shown in Table 6.

Table 6: Predictors of Interpersonal Relationship

(N = 109)

Variables	$\beta$	p	Adj.R <sup>2</sup>	F(p)
Mental Health	-0.31	.000**	0.330	27.550(.000)
Self-directed Learning Ability	0.45	.000**	0.330	27.550(.000)

\*\* : p < .01, \* : p < .05

**F. Discussion**

The present study was attempted to provide the basic data necessary for the development of nursing programs that can improve interpersonal relationship ability, which is an important factor for establishing human relations in the nature of nursing along with the formation of amicable interpersonal relationships among nursing students, by examining the influences of mental health, emotional intelligence, and self-directed learning ability in the interpersonal relationships of nursing students.

The score of interpersonal relationships of the participants in the present study was 88.26, which was higher than the score of 80.90 of a study<sup>32</sup> on nursing students, but slightly lower than the score of 89.22 in the study by Jeong and Lee<sup>33</sup>. Although the scores of interpersonal relationships of the participants in the present study were moderately high, it is necessary to further improve interpersonal relationship ability because it is an important factor in clinical practice when the nature of nursing that emphasizes the nurse-patient interaction is considered. To that end, it is necessary to have nursing education programs for the improvement of interpersonal relationship ability, which continuously operates throughout college life, and it will also improve competence in clinical practice by positively influencing the formation of the nurse-patient relationship required in clinical practice in the future.

In the present study, the interpersonal relationship was found to be better in the group with a high level of satisfaction with their major than the group with an average level of satisfaction with their major when the relationship between interpersonal relationships and general characteristics was examined. Lee et al.<sup>34</sup> also

found in their study that the higher the satisfaction with major, the higher the interpersonal relationship ability, and it appears that higher satisfaction with major and department induces activeness in learning and positively influences interpersonal relationships. Therefore, reflecting students' satisfaction with major in conducting nursing education programs to improve interpersonal relationships may be a method to enhance the intervention effect.

The present study found significant positive correlations among mental health, emotional intelligence, and self-directed learning ability, and the finding is similar to the finding of the study conducted by Yi et al.<sup>35</sup> in which interpersonal relationship was found to have a significant positive correlation with emotional intelligence.

The present study found the factors that affect interpersonal relationships of nursing students are mental health and self-directed learning ability, and their explanatory power was 33%. Previous studies have found that interpersonal relationships and mental health influence each other. Kim et al.<sup>18</sup> stated in their study that self-directedness of learning influences not only academic achievement but also interpersonal relationships in school, and Lee<sup>36</sup> stated that emotional experience influences mental health with interpersonal relationships acting as a mediator. The results suggest that students with better mental health have a greater scope of understanding others along with rational thinking, and greater ability to recognize emotions, which appears to lead to positive interpersonal relationships. Furthermore, students who have higher ability of self-directed learning appear to have played active roles not only in their education but also in forming interpersonal relationships through proactive interactions. The significance of the present study lies in the discovery of a different possibility of self-directedness by expanding the research scope of self-directed learning ability to interpersonal relationships, compared to many previous studies that limited their research of self-directedness mainly to learning. A study by Yu<sup>37</sup>, on the other hand, showed that mental health has no effect on interpersonal relationships, which is contrary to the finding of the present study. Further accumulation of research on the related topic in future studies is necessary because the participants in the present study and the study by Kim et al.<sup>18</sup> were college students while the participants in the study by Yu<sup>37</sup> were adolescents, and there were differences in research methodology as well.

Emotional intelligence was not found to be a factor that affects interpersonal relationships in the present study, but it was found to be a factor that influences interpersonal relationships in a previous study<sup>38</sup>. In particular, the study reported that among the sub domains of emotional intelligence such as emotional regulation, utilization of emotion, and recognition of emotions in others showed positive influences on interpersonal relationships, and among those, the recognition of emotions in others was found to have the highest influence. A repeated study with similar participants and the same scale appears to be needed as the differences in research findings may have been because the participants in the present study were nursing students, although the participants in both the present study and previous studies were college students in health science. The scale used in the present study was different from the ones used in previous studies, and emotional intelligence of the participants was different.

#### IV. CONCLUSION

Based on the results of the present study, it is necessary to develop a nursing education program to improve the interpersonal relationship ability of nursing students with consideration to mental health and self-directed learning ability that affects interpersonal relationships, and to attempt to diversify the educational program depending on an individual student's level of mental health and self-directed learning ability. It is also necessary to consistently conduct follow-up studies using various research methodologies and from various perspectives to investigate diverse elements that affect interpersonal relationship ability.

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## Analysis on the Effect of Exercise Program on TC, HDL, LDL, and TG of Elementary School Students and the Elderly

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### Abstract---

**Background/Objectives:** Physical activities are an important part of human life. Especially, physical fitness that begins to develop during elementary school continues to influence human life even in the old age.

**Methods/Statistical Analysis:** For the study, a meta-analysis was conducted on an exercise program that was applied to elementary school students and elderly subjects between 2000 and 2012, in order to investigate their effects on the physiological variables.

**Findings:** TC, HDL, LDL, and TG. The result suggests, for both elementary school students and the elderly, TC, LDL, and TG, which are the basic components of energy, decreased although HDL increased slightly, to a degree that does not have a significant effect on health, suggesting exercise programs are effective for both elementary school students and the elderly for maintaining healthy biorhythm.

**Improvements/Applications:** Future research will need to take into account more in-depth variables and a wider range of exercise programs.

**Keywords---** Meta-Analysis, Total Cholesterol, HDL, LDL, Triglyceride.

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## I. INTRODUCTION

Throughout life, from childhood to old age, active physical activities have great importance on the quality of life. Especially, the diet and exercise habits during childhood can determine the health during youth, adulthood, middle age, and old age. Recently, due to increasing diversity and quantity of available foods, obesity during childhood became a serious cause of cardiovascular diseases.

As variables representing metabolic diseases, TC, HDL, LDL, and TG are common factors that are included in medical tests. Total cholesterol (TC), high density lipoprotein cholesterol (HDL), low density lipoprotein cholesterol, and triglycerides (TG), which are associated with metabolic diseases, are involved in storage and transport of Bio-energy and are most influenced by diet and exercise<sup>1</sup>.

Physical activities during childhood and old age are highly important for healthy life in earlier and later stages of life. Physical fitness, basic motor skills, and practice of exercise formed during elementary school can have effects throughout one's lifetime<sup>2</sup>. In addition, physical activities during old age are essential for maintaining health, and more research on exercise programs suitable for the elderly will need to be conducted in order to help them overcome physical disorders and deterioration of physical functions as a result of aging<sup>3</sup>.

Recently, in the field of sociology and pedagogy, many studies are being conducted based on meta analyses. However, despite the large volume of quantitative and qualitative research conducted in physical education, research based on meta analysis for integration and generation of quantitative studies of the same subjects is limited<sup>4</sup>.

Recent meta analyses conducted in other countries include the study on resistance training conducted by Steven and Rick<sup>5</sup>; systematic review and meta-analysis related to a rehabilitation exercise program for patients with coronary artery diseases by Rod, Allan, Shah, Judith, Hussein, Karen, Becky, James, David, and Neil<sup>6</sup>; study on the effects of exercise on children and youths according to the exercise intensity by Behringer, Vom, Matthews, and Mester<sup>7</sup>; study on the effects of exercise on physical functions and daily life of the elderly by Chou, Hwang, and Wu<sup>8</sup>; and meta-analysis on correlation between physical activities and academic achievement of children by Fedewa and Ahn<sup>9</sup>.

The purpose of this study is to propose the effect size of exercise programs on TC, HDL, LDL, and TG of elementary school students and the elderly, and provide relevant data based on meta-analytic statistical method. The effect size data were provided to help improve reliability of future research, as they can be used for drawing an overall conclusion of different studies and clearly showing the size of the relevant effects.

## II. RESEARCH METHOD

### A. *Criteria for Selecting Articles*

This study was based on 68 journal papers and 7 doctoral theses related to exercise programs applied to elementary school students and the elderly that were published in South Korea between 2000 and 2012. The selection criteria were: first, the independent variable was either 'exercise program' or 'exercise intervention program'; second, the subjects were groups of elementary school students and those of the elderly aged 65 and older

### B. *Analysis Method*

This study proposed the effects of exercise on TC, HDL, LDL, and TG, among various physiological variables, of elementary school students and the elderly, as effect sizes calculated based on meta-analysis. The number of cases included in the collected literature, mean, standard deviation, significant probability, coefficient of correlation, t-value, and F-value were entered in the meta analysis programs, i.e., David Effect Size Determination developed by Willson, Mix 2.0, Excel 2007, among others, by using a coding method developed by Yangsuk Jeong<sup>10</sup>.

### C. *Conversion and Homogeneity Test Based on Effect Size*

As it is important to decide the signs for effect size according to the mean direction based on the coding table, increase was marked with + and decrease with -. The effect size was calculated for each study by using Effect Size Determination, based on the descriptive statistics of the experimental groups before and after applying the respective exercise program.[Figure.1] And then, to verify homogeneity of each dependent

variable, a homogeneity test on the effect sizes of the exercise programs was conducted. After calculating Q values and threshold values of chi-square, if the results were smaller than the threshold values, the data were deemed homogeneous.

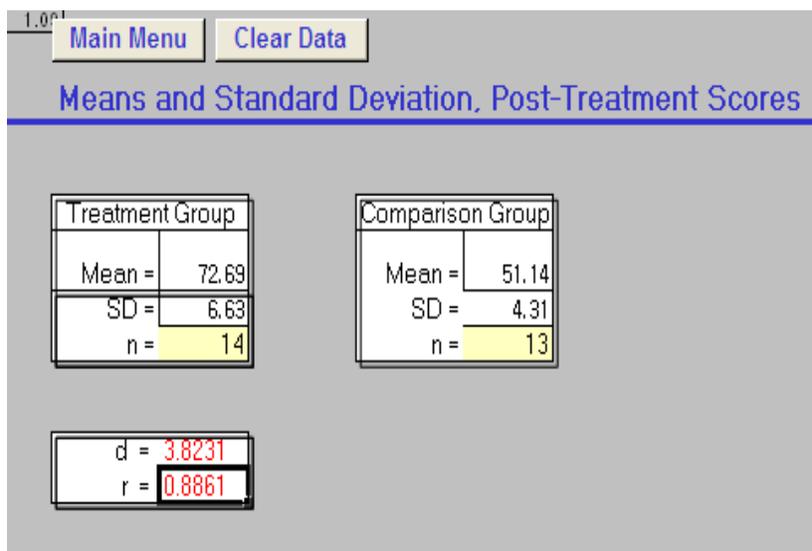


Figure 1: Calculate Effect Size Using Effect Size Determination Program

### III. RESULT

#### A. Effects on Metabolic Variables of Elementary School Students

[Table 1] shows the mean effect sizes related to metabolic variables of elementary school students before and after exercise. The mean TC effect size was clearly lower, -0.365, after exercise than before exercise, suggesting TC decreased by 36.5% after exercise. The mean effect size of HDL increased significantly after exercise, 0.649, suggesting HDL increased by 64.9% after exercise in comparison to before exercise. The mean effect size of LDL was clearly lower, -0.543, after exercise than before exercise, suggesting LDL decreased by 54.3% after exercise. The mean effect size of TG showed a significant decrease, -.819, after exercise, meaning TG significantly decreased, by 81.9%, after exercise than before exercise.

Table1: The Mean Effect Sizes Related to Metabolic Variables of Elementary School Students Before and After Exercise

dependent variable	N	d	SD_D	Q	U	95%confidence belt		limiting value	NFS
						upper	lower		
TC	7	-0.365	0.404	9.546	0.358	-0.458	-0.272	93.945	60.257
HDL	8	0.649	0.632	1.204	0.706	1.087	0.211	14.067	17.960
LDL	7	-0.543	0.637	1.633	0.327	-0.071	-1.015	12.592	12.005
TG	7	-0.819	1.086	57.016	0.206	-1.068	-0.570	93.945	225.898

N: number of data, d (:SD\_D): mean of effect size (effect size of SD ), Q: statistic of d, U3: total effect size, NFS: N fail-safe

#### B. Effects on Metabolic Variables of the Elderly

[Table 2] shows the mean effect sizes related to metabolic variables of the elderly before and after exercise. The mean TC effect size was clearly lower, -0.661, after exercise than before exercise, suggesting TC decreased by 66.1% after exercise. The mean effect size of HDL increased after exercise, 0.396, suggesting HDL increased by 39.6% after exercise in comparison to before exercise. The mean effect size of LDL was clearly lower, -0.516, after exercise than before exercise, suggesting LDL decreased by 51.6% after exercise. The mean effect size of TG showed a noticeable decrease, -.391, after exercise, meaning TG significantly decreased, by 39.1%, after exercise than before exercise.

Table 2: the Mean Effect Sizes Related to Metabolic Variables of the Elderly Before and After Exercise

dependent variable	N	d	SD_D	Q	U3	95%confidence belt		limiting value	NFS
						upper	lower		
TC	14	-0.661	0.704	1.771	0.299	-0.293	-1.030	22.362	32.270
HDL	11	0.384	0.396	2.298	0.643	0.618	0.150	18.307	10.120
LDL	10	-0.516	0.703	1.312	0.329	-0.081	-0.951	16.919	15.800
TG	11	-0.391	0.613	1.194	0.361	-0.029	-0.753	18.307	10.505

N: number of data, d(:SD\_D): mean of effect size (effect size of SD ), Q: statistic of d, U3: total effect size, NFS: N fail-safe

#### IV. DISCUSSION

This study proposed effect sizes by using meta-analysis based on descriptive statistics in previous literature, in order to examine the effects of exercise programs on TC, HDL, LDL, TG, and body fat percentage of elementary school students and the elderly.

The findings support research that suggests a clear decrease of TC after exercise in elementary school students<sup>11</sup>, implying that exercise has an effect on reducing total cholesterol. In the elderly, the effect was much greater than in elementary school students<sup>12</sup>.

HDL is good cholesterol that cleans blood vessels. In other words, it dissolves wastes accumulated in blood vessels. As a result of this study HDL, there was a big effect after the exercise in the elementary school students than before the exercise. These results are also proven in other literature. And the low effect size (0.384) for the elderly. The effect of exercise on the elderly was lower than that of elementary school students. The removal of wastes accumulated in the blood vessels of the elderly means that they are not removed better than the elementary school students. It is considered that the effect of exercise is not as large as that of elementary students (young people) due to aging<sup>13</sup>.

LDL accumulates waste in blood vessels. Of course, if it is appropriate, it makes the blood vessel robust, but if it is too much, it becomes too thick, which reduces the elasticity of blood vessels and narrows the blood vessels, resulting in dangerous consequences such as adult diseases. There was a clear reduction effect in the elementary school students after the exercise than before the exercise. Other literature has shown similar results<sup>14</sup>. The elderly also showed a similar size (-0.516) as the elementary school students<sup>15</sup>. It is very encouraging that HDL, which causes exercise to dissolve waste materials in blood vessels, is lower than that of elementary school students, but LDL, which accumulates blood vessel wall waste, is reduced like elementary school students. That is, the exercise has the effect of decreasing bad LDL regardless of age and oldness, and it prevents further accumulation of waste products in blood vessels.

TG causes subcutaneous fat and abdominal obesity. It has the advantage of having body temperature protection and boldness, but once it is accumulated, it does not shrink well. If it is excessive, it causes vascular diseases like many adult diseases. In the case of elementary school students, exercise was more effective than exercise, and in the elderly, there was a low effect<sup>16</sup>. Clearly lower than elementary school students are caused by various reasons such as decreased endocrine function due to aging, decreased muscle mass, decreased metabolism of human body. Therefore, it is very difficult to reduce TG in old age. Therefore, it is very important to maintain dietary habits and lifestyle habits since young.

#### V. CONCLUSION

This study collected studies on exercise programs for elementary school students and the elderly conducted between 2000 and 2012, and performed a meta-analysis on 105 cases including 75 studies on physiological variables. The result was as follows:

First, the mean effect size of TC decreased by 0.365 in elementary school students and by 0.661 in the elderly.

Second, the mean effect size of HDL increased by 0.649 in elementary school students and by 0.384 in the elderly.

Third, the mean effect size of LDL decreased by -0.543 in elementary school students and 0.516 in the elderly.

Fourth, the mean effect size of TG decreased by 0.819 in elementary school students and 0.391 in the elderly.

The result suggests exercise programs are highly effective for reducing TC, LDL, and TG, and, thereby, body fat percentage. Although HDL increased in both elementary school students and the elderly, the effective sizes did not differ greatly before and after exercise. Therefore, the highly positive effects of exercise programs on reducing body fat percentage have been proven. Future study will need to include more comprehensive exercise programs and multilateral variables.

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## The Mediation of Social Anxiety between Self-Monitoring and SNS Addiction Tendency

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### Abstract---

**Background/Objectives:** The purpose of this study was to investigate whether social anxiety acts as a mediating variable when self-monitoring influences SNS addiction tendency.

**Methods/Statistical Analysis:** In order to achieve the research purpose, we conducted a survey of 380 students from universities in central South Korea on Self-monitoring, Social anxiety, SNS addiction tendency, and some demographics. Social anxiety and SNS addiction tendency were measured on a multidimensional scale. We used Mplus 7.0 to analyze the path between variables.

**Findings:** According to the results of factor analysis on Social anxiety and SNS addiction concept which is conceptualized in multi dimension, Social anxiety consists of two factors of Social avoidance and Social discomfort. SNS addiction tendency has two factors of Immersion and Regulation failure. As a result of path analysis on the overall concepts, Social anxiety functions as a mediator between Self-monitoring and SNS addiction tendency. In other words, the higher the Self-monitoring, the lower the level of Social anxiety, which again indicates a tendency to lower the SNS addiction. In the path analysis of the sub-factors, Self-monitoring has a direct negative impact on Social avoidance and Social discomfort, and a direct positive impact on Immersion and Regulation failure. Social avoidance, on the other hand, has a direct effect on Immersion and Regulation failure, and Social discomfort directly on Immersion. However, the effect of Social discomfort on Regulation failure was not significant. Social avoidance has a negative effect on the indirect path from Self-monitoring to Immersion, whereas Social discomfort has a positive effect.

**Improvements/Applications:** It is necessary to use different counseling strategies according to the main reasons of SNS addiction in counseling about people with SNS addiction tendency.

**Keywords---** Self-Monitoring, Social Anxiety, SNS Addiction Tendency, Mobile Internet, Smartphone.

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## I. INTRODUCTION

With the emergence of smartphones, it has become possible to put knowledge of the world in one hand or share it with others, beyond the space and time constraints that existing media have had. South Korea's smartphone holdings ranked first in the world with 88% of the total population<sup>1</sup>. Smartphones have replaced many different devices with their existence, and they are recognized as portable computers beyond the functional level of one-to-one communication such as telephone. In particular, with smartphones, as the time and space limitations disappear, the *social networking service* (SNS) functions that enable one-to-many or many-to-many communication have developed more widely. According to the Internet Usage Survey conducted by the Korea Internet and Security Agency (KISA) of South Korea in 2015, 99.5% of smartphone users said they are using communication services<sup>2</sup>. In addition, 81% of mobile Internet users reported using mobile social networking within the last month, which was a 13% increase over the previous year. The main reason for using social networking services was personal interest sharing (67%). Due to the advantages of SNS, its power seems to be growing day by day: through SNS, people can see the feelings of the friends they have forgotten, can communicate with friends who cannot meet because they are far away, can share information with people who have similar interests, and can form and communicate with new personal connection.

In this way, SNS provides various useful help to people, but recently, problems related to the use of SNS have been reported<sup>3,4</sup>. Excessive use of SNS negatively affects the formation of friendships and personal identities in the real world by allowing users to invest more time in virtual interpersonal relationship formation through SNS than in forming the interpersonal relationship in the real world<sup>5</sup>. Thus, excessive SNS users can experience physical problems<sup>6</sup>, and the various human relationships obtained through SNS may also cause psychological distress because they can stay in a more virtual relationship than real. As a psychological problem of SNS users, obsession with relationship orientation is mentioned<sup>7</sup>. Those who were not satisfied with the real interpersonal relationship often resolve the dissatisfaction with the interpersonal relationship through the virtual contact with the SNS. Repeatedly eliminating the unsatisfied part of interpersonal relationship through SNS will increase the possibility of relying on SNS, which can lead to SNS addiction. However, there is still little research on why SNS addiction tends to increase. Particularly, there is also very few research on which personal characteristics may increase SNS addiction tendency.

The purpose of this study is to investigate the effect of self-monitoring and social anxiety as a major predictor of SNS addiction tendency. It is mentioned that people with low self-monitoring are short of the information accumulation of self-presentation skills and does not have a diverse range of self-presentation skills<sup>8</sup>. Self-monitoring is a tendency of self-management, which has a great influence on interpersonal relationships. People with high self-monitoring are less likely to receive a negative evaluation compared to those with low self-monitoring because they modify and manipulate their images and behaviors that can lead to negative ratings from others in order to receive a positive evaluation from others. Therefore, the possibility to feel anxiety in the social situation becomes relatively low. On the other hand, people with low self-monitoring are more likely to be negatively assessed because they do not respond sensitively to cues that can cause negative evaluation of other people, and therefore are more likely to feel anxiety in social situations compared to those with high self-monitoring. In this context, those who have higher level of social anxiety due to low self-monitoring use SNS repeatedly to relieve the anxiety due to needs for interpersonal relationship that is not satisfied in reality. And this can lead to SNS addiction. In other words, this study predicts that the level of social anxiety will vary depending on the level of self-monitoring, and that it will affect the level of SNS addiction tendency. Moreover, this study wants to examine whether the relationship between self-monitoring and SNS addiction tendency is mediated by social anxiety.

## II. THEORETICAL BACKGROUND

### A. Self-Monitoring

People observe their surroundings sensitively through attention and control, and in response to them, take action to control and regulate themselves to try to be recognized by others in social situations. Snyder<sup>9</sup> conceptualized individual difference variable related to these behaviors as self-monitoring, which means a tendency to self-control and self-manage according to social situations in order to judge social adaptation. This means that people are trying to manipulate and express their images and to have the sort of the abilities in order to adapt better to social activities or interpersonal relationships, or to be recognized by others<sup>9,10</sup>.

As mentioned above, self-monitoring is individual difference variable. People with high self-monitoring tend to be sensitive to the cues of social situations because they are interested in the appropriateness of their behavior in interpersonal relationships. Therefore, they are more active in conversation compared to those with low self-monitoring, and are better able to communicate with others<sup>11,12</sup>. People with higher self-monitoring (compared to the lower ones) can express themselves as people with diverse characteristics, have the ability to express various emotions intentionally, and can also read other people's feelings better<sup>13</sup>.

On the other hand, people with low self-monitoring have characteristics that are not sensitive to social cues<sup>9</sup>. According to Snyder, people with low self-monitoring lack the accumulation of information about self-presentation and does not have a variety of techniques for self-presentation. Therefore, their expression and self-presentation are controlled by their emotional states, attitudes, values and propensity. In other words, they are more likely to pay more attention to their own internal emotional and cognitive states than to interrelated dynamics in social contexts<sup>8</sup>.

These characteristics of self-monitoring will serve to explain and predict the problems of using SNS like SNS addiction. However, researches on this subject are still very poor. Therefore, this study aims to investigate the role of self-monitoring in the problem of using SNS (for example, SNS addiction tendency).

### ***B. Social Anxiety and Self-Monitoring***

Social anxiety refers to feeling anxiety in social situations that can be observed or assessed by others, acting in a negative way, or afraid of anxiety symptoms<sup>14</sup>. According to DSM-V, everyone can feel some sense of anxiety in social situations, but if they are severe enough to cause adverse effects in daily life, they can be diagnosed as social anxiety disorder.

People usually experience social anxiety because they are afraid of others' evaluations, but situations that cause such fear and anxiety vary<sup>15,16</sup>: When you need to make an official announcement, when you're criticized by someone, when you talk to an authoritative person, when someone watches you work, when you become a group leader, and etc. It can be said that psychological discomfort due to unfamiliarity with other people or strangers causes social anxiety. It is common for people with high social anxiety to feel uneasy about being assessed in a social setting and as a result they want to avoid a variety of social situations because they think they will get negative ratings from others. Therefore, fear of negative evaluation is a key characteristic of social anxiety. Those who suffered from social anxiety generally felt more fear of negative evaluation than others who are not, and the fear of negative evaluation had a strong positive correlation with the degree of social anxiety<sup>17</sup>.

In a study of the relationship between self-monitoring and social anxiety, people with high self-monitoring have the characteristics of manipulating and modifying his/her image in order to receive positive evaluations by others<sup>10</sup>. These people are relatively sensitive to the gaze of others compared to people with low self-monitoring. They care about their surroundings to look good on others, and tend to control and manage themselves so that they do not feel uncomfortable in situations that can cause social anxiety. Through these control management processes, people with high self-monitoring will feel less social anxiety. On the other hand, people with low self-monitoring pay more attention to their own internal emotional and cognitive states than to active interactions. Because they are used to pay attention to their inner state rather than to others, they are not accustomed to actively controlling and controlling when they are in a social situation.

### ***C. The Influences of Self-Monitoring and Social Anxiety on SNS Addiction Tendency***

SNS is defined as a platform service that connects people to people based on the Internet and can form, maintain and manage relationships with others through information sharing, personal interconnection management, and self-expression<sup>2</sup>. If the past SNS was based personal computer like blogs, cafes, Cyworlds, etc., the current SNS can be used as a more open form to share information with others based on mobile like Facebook, Instagram, Band, Twitter, and so on, and the individuality of each SNS is getting stronger.

The sudden increase in the use of SNS has revealed a lot of problems<sup>2</sup>. The ease with which you can easily access from anywhere becomes a disadvantage, and you can fall into the form of addiction by using excessive SNS and relying on it. Here, addiction involves both material and immaterial addiction, and both of them have six characteristics (dependency, mood change, tolerance, withdrawal, conflict, relapse)<sup>18</sup>. According to Casas, Rosario and Rosario<sup>19</sup>, immaterial addiction is synonymous with behavioral addiction, including smartphone addiction, Internet addiction, SNS addiction, shopping, and gaming. However, in social psychological research,

the term 'SNS addiction' is currently not universally defined, and diagnostic criteria have not been developed to define it. The reason for this is that SNS-related research has been relatively recent compared to other studies and no consistent diagnostic criteria have been provided<sup>4</sup>. In previous researches, researchers use various terms and deal with SNS overuse. Jung<sup>20</sup> defined SNS addiction as experiencing withdrawal and tolerance due to excessive immersion in online interpersonal relationships and interfering with daily life. She also developed 'SNS addiction tendency scale for college students' which has four sub-dimensions: (a) Regulation failure and Disability in daily life, (b) Immersion and Tolerance, (c) Avoidance of negative emotion, (d) Virtual world orientation and Withdrawal.

This study intends to refer to what appears to be a form of addiction by overuse of SNS as 'SNS addiction tendency'. In fact, in the discussion on the tendency to be addicted to SNS, addiction tendency and addiction need to be distinguished. Addiction refers to a case to experience satisfaction, dependence, tolerance, and withdrawal involving negative bodily / psychological symptoms from the subject by being overloaded with a particular subject<sup>21</sup>. However, the main focus of this study is 'SNS addiction tendency', which is not a pathological addiction state but rather a relatively high dependence behavior through SNS, which cannot control the use time, resulting in decreased work efficiency, lack of sleep time, and a decrease in interest in everyday life.

People with high social anxiety can feel anxiety seriously about the evaluation they receive directly in real situations. For this reason, they may be immersed in the formation of relationships through virtual situations that may feel less anxious, and this immersion phenomenon may lead to addiction tendency. In a real unfamiliar social situation, people feel psychological discomfort and anxiety increased. Therefore, to avoid social anxiety, those with high social anxiety are predicted to be more active in virtual situations and SNS where they feel more comfortable but can reveal themselves and interact with other people. The reason why those who are experiencing social anxiety has a tendency to be addicted to SNS can be related to connection desire<sup>22</sup>. According to Maslow<sup>23</sup>, every human being wants to meet his or her desire to belong to somewhere when the physiological needs are resolved. People with high social anxiety may want to form a social relationship in virtual environment with others based on profile information such as their gender, age, region, school, interest, etc. through SNS. Because they can meet unsatisfied needs of real world in virtual world, their SNS-dependent tendency will increase. The space of SNS has less time and space constraints than reality, so there is room to control their real appearance. Therefore,

They are expected to appeal to their emotions to the other people in the virtual relationship rather than to the real space where they can feel fear, to make an interpersonal relationship in virtual space, and to experience compensation accordingly.

### **III. MATERIALS AND METHODS**

#### **A. Participants**

Six hundred college students of a university in the middle area of South Korea responded a questionnaire. Among them, participants who didn't use SNS and participants who responded inappropriately were excluded. Then three hundred and eighty SNS users was included in the analysis. After they listened to explanation about the contents of the questionnaire and agreed whether or not to participate, answered the following questions. Responses to the questionnaire was self-report type. Distribution of the participants was as follows: 169 male students (44.7%), 206 female students (54.2%), the mean age 21.5 (SD = 3.52).

#### **B. Measurements**

##### ***Self-Monitoring***

Self-monitoring measure developed by Snyder<sup>9</sup> was used. This scale consisted of 25 items of the True/False type at the time of development, and Snyder & Gangestad<sup>24</sup> reviewed it and reduced it to 18 items. In this paper, the measure was changed from True/False type to the 7 point Likert scale. This means that the higher the score, the higher the self-monitoring level, and the lower the score, the lower the self-monitoring level.

##### ***Social Anxiety***

To measure social anxiety, the Korean-Social Avoidance and Distress Scales (K-SAD) of Choy & Lee<sup>15</sup> was used. This scale measures the degree of experience of anxiety in social situations and the tendency to avoid

potentially uncomfortable and disgusting social situations. The sub-factors are (a) social avoidance, (b) social anxiety, and the number of questions for each factor is fourteen items. Social avoidance is defined as the avoidance of social situation itself and the psychological discomfort in situations in which a respondent should make relationships with other people, and social anxiety is defined as anxiety in situations where meeting with strangers. This scale consisted of 28 items' 7 point Likert scale. The higher the score, the higher the social anxiety level. The lower the score, the lower the social anxiety level.

**SNS Addiction Tendency**

To measure the addiction tendency of SNS, the questionnaire for college students of Jung <sup>20</sup> was used. The scale consists of 24 items and has four sub-factors: (a) Regulation failure and Disability in daily life, (b) Immersion and Tolerance (c) Negative emotional avoidance (d) Virtual world orientation and Withdrawal. Regulation failure and Disability in daily life, Immersion and tolerance factors have 7 items each, Avoidance of negative emotion, Virtual world orientation and Withdrawal have 5 items each. Regulation failure and Disability in daily life means that failure to regulate SNS usage directly leads to academic difficulties and decrease of interest in other activities, resulting in an impairment of daily living. Immersion and Tolerance are the consequences of using a lot of time and thought in the SNS, which means that the end result is tolerance. Negative emotional avoidance means using SNS to forget or reduce the negative emotions such as helplessness, depression, anxiety, and stress. Virtual world orientation and Withdrawal mean discomfort when trying to find self-worth in SNS, but not in SNS situation. This measure consists of 7-point Likert scales, which means that the higher the score, the more likely it is to be careful about SNS addiction.

**IV. RESULTS**

**A. Validation of Multidimensional Scales**

In this study, Social anxiety and SNS addiction tendency were conceptualized as multidimensional. Therefore, factor analysis was carried out to confirm whether the results were produced according to the original concept.

Principal axis method was used for factor extraction, and Varimax method was used for factor rotation. The number of factors was evaluated by Scree test and factor loadings of 1 or more.

As a result of factor analysis of social anxiety, several items were removed. And as a result, 17 items were grouped into two factors. The items tied to factor 1 were tied to items related to 'Social avoidance', accounting for 29.26% of the total variance. The items tied to factor 2 were tied to 'Social discomfort' and accounted for 17.3% of the total variance.

As a result of factor analysis of SNS addiction tendency, four factors presented in the existing scale were reduced to two factors in this paper. The items related to factor 1 were tied to items related to 'Immersion', accounting for 30.28%. The items tied to factor 2 were tied to 'Regulation failure' and the total explanatory variable was 16.37%.

**B. Relationships Between Overall Variables**

We used Mplus 7.0 to verify the relationship between the overall constructs. The R<sup>2</sup> for social anxiety was .366, and the R<sup>2</sup> for SNS addiction tendency was .060. Table 1 shows the path coefficients for each overall construct. Both direct and indirect pathways were significant.

Table 1: The Relationships between Overall Constructs

Path		B	SE	β	t
Direct	Self-monitoring → Social anxiety	-.829	.056	-.605	-13.831***
	Social anxiety → SNS addiction tendency	.394	.087	.306	4.521***
	Self-monitoring → SNS addiction tendency	.293	.112	.166	2.621**
Indirect	Self-monitoring → Social anxiety → SNS addiction tendency	-.327	.040	-.185	4.594***

\*\* p < .01, \*\*\* p < .001

R<sup>2</sup>= .366 for Social anxiety; R<sup>2</sup>= .060 for SNS addiction tendency

**C. Relationships between sub-factors**

There was a significant relationship between the overall constructs, but social anxiety and SNS addiction tendencies were conceptualized as multidimensional. Therefore, it is necessary to investigate the relationship between the sub-factors and to investigate the influence of sub-factors of self-monitoring and social anxiety on sub-factors of SNS addiction tendency using Mplus. Table 2 shows the results of the path analysis between the sub-factors.

All pathways except [Social discomfort → Regulation failure] path of direct paths and [Self-monitoring → Social discomfort → Regulation failure] path of indirect paths were significant.

Table 2: The Relationships between Sub-Factors

	Path	B	SE	β	t
Direct	Self-monitoring → Social avoidance	-.896	.064	-.570	-13.911***
	Self-monitoring → Social discomfort	-.706	.080	.459	-8.814***
	Self-monitoring → Immersion	.259	.106	.145	2.444*
	Self-monitoring → Regulation failure	.355	.135	.172	2.627**
	Social avoidance → Immersion	.479	.070	.421	6.820***
	Social avoidance → Regulation failure	.378	.086	.288	4.392***
	Social discomfort → Immersion	-.156	.071	-.134	-2.203*
	Social discomfort → Regulation failure	.014	.086	.010	.160
Indirect	Self-monitoring → Social avoidance → Immersion	-.429	.034	-.240	-6.951***
	Self-monitoring → Social avoidance → Regulation failure	-.338	.038	-.164	-4.332***
	Self-monitoring → Social discomfort → Immersion	.110	.028	.062	2.177*
	Self-monitoring → Social discomfort → Regulation failure	-.010	.030	-.005	-.158

\* p < .05, \*\* p < .01, \*\*\* p < .001

R<sup>2</sup>= .325 for Social avoidance; R<sup>2</sup>= .210 for Social discomfort; R<sup>2</sup>= .135 for Immersion; R<sup>2</sup>= .056 for Regulation failure

**V. DISCUSSION AND CONCLUSION**

The purpose of this study was to examine the influence of Self-monitoring and Social anxiety of college students on SNS addiction tendency. The main focus was to verify that Social anxiety will play a mediating role between Self-monitoring and SNS addiction tendency.

The analysis was largely in support of expectations. As the initial expectation of the relationships between the overall constructs, overall Self-monitoring and overall Social anxiety are negatively correlated, and both of Social anxiety and Self-monitoring have a positive relationship with SNS addiction tendency. In other words, the higher the Self-monitoring level, the lower the Social anxiety level. And SNS addiction tendency has been positively influenced by both Self-monitoring and Social anxiety, but the influence of Social anxiety is stronger. According to the results of this study, it seems reasonable to say that people use SNS to reduce Social anxiety, but not to provide appropriate self-presentation to others.

In this study, Social anxiety and SNS addiction tendency were conceptualized as multidimensional, so it was necessary to examine the relations between sub-factors. The results of the path analysis between the sub-factors showed that Self-monitoring had direct negative impacts on two sub-factors (Social avoidance and Social discomfort) of Social anxiety. Social avoidance had a direct positive impacts on two sub-factors (Immersion and Regulation failure) of SNS addiction tendency, and Social discomfort directly positively on Immersion. However, the effect of Social discomfort on Regulation failure was not significant. Social avoidance had a negative effect on the indirect path from Self-monitoring to Immersion, whereas Social discomfort had a positive effect. In other words, people with low Self-monitoring are immersed in SNS by increasing the level of Social avoidance and lowering the level of Social discomfort. This is in contrast to the superficial impression (the higher the Self-monitoring level, the higher the tendency to add to the SNS).

This study has several significances and implications. First, from the theoretical point of view, this study will provide value for reference in a situation where research on SNS addiction tendency is still insufficient. Second, even though there were studies on the effects of Self-monitoring and Social anxiety on the SNS addiction tendency, the studies tended to deal only with Self-monitoring and Social anxiety as predictors. However, there was no study on whether Social anxiety functions as a mediator between Self-monitoring and SNS addiction tendency. In practice, when counseling people with SNS addiction tendencies, it is suggested that different counseling strategies will be possible depending on whether the person's addiction is due to Immersion or Regulation failure. If it is due to Immersion, we should find a strategy to reduce both Social avoidance and Social discomfort. However, if it is due to failure of regulation, we should focus on reducing Social discomfort.

Like other studies, this study also has limitations. First, this study was conducted only for students enrolled in a university in South Korea. There will be a limit to the generalization of research subjects because they are locally biased. Future studies may need to be conducted on students from a variety of schools. In addition, adolescents who are growing up rather than college students may have a higher tendency to be addicted to SNS due to lack of experience in control and regulation. Therefore, there will be a need to study adolescents as well as students from other universities in other local area.

Second, in this study, self-report questionnaires were used to collect data. Therefore, Social anxiety, Self-monitoring, and SNS addiction tendency of the respondents may be exaggerated or reduced more than real state, and the response may be distorted due to a silent response or misunderstanding of the question content. In future studies, it would be useful to study through the interview method through the experts or the observation method.

Third, those who responded that was high in the 'SNS addiction tendency scale' of this study are people who do not live by experiencing big problems in daily life. Therefore, in future studies, I think that using in-depth interview that can measure the addiction tendency more accurately can have a more meaningful result.

Fourth, the error of the SNS scale need to be examined. In the paper, four factors were introduced originally, two factors were produced finally. It may be that the unique characteristics of students at Sun Moon University may have played a role, or the scale itself. Therefore, there is a need to develop more sophisticated SNS measurement tools in future studies.

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## A Study about the Influence of the Disabled and Socioeconomic Status on Social Capital

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### Abstract---

**Background/Objectives:** The purpose of this study is to empirically analyze the impact of the characteristics of the disabled and socioeconomic status on social capital through components of a social capital which are network, participation and reciprocity.

**Methods/Statistical Analysis:** The empirical data used in this study were from the second panel survey data of the Employment Agency for the Disabled. A Multiple Regression statistical analysis was performed with SPSSWIN 21.0 to analyze the relationship between disability characteristics and social capital.

**Findings:** The results found that disability characteristics and socioeconomic status showed significant effects on the three components of social capital and the sum of social capital. More specifically, characteristics of disability were a large influence, and the network level was the lowest the mental disorder. Socioeconomic status also gave a significant effect on the network. Also, socioeconomic status has been linked to relatively high levels of employment, education, and monthly income. The purpose of this study is to analyze the characteristics of the preexisting studies by analyzing the characteristics of disability characteristics by measuring the characteristics of obstacles that take advantage of the behavioral variables inherent in the behavioral characteristics of the existing medical classification. The outcome of this study proves that the social capital has a strong impact on the quality of life of the disabled, but it will have to be analyzed by the end of the study to determine how the quality of life depends on the acquisition of social capital.

**Improvements/Applications:** It is necessary to develop a policy of welfare policy that aims to expand social capital through Public network deployments from the perspective of future social capital.

**Keywords---** The Disabled, Socio-Economic Status, Quality of Life, Social Capital, Network, Participation, Reciprocity.

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## I. INTRODUCTION

Recently, interest in the quality of life is increasing rapidly, and it is no exception to the disabled. Nevertheless, recent studies show that disabled persons are suffering from a variety of factors besides disability and mental constraints of disability, and are reported to be inferior to the quality of life (O Se-Ran, 2006)<sup>1</sup>. In particular, the concept of social support, which is important for the quality of life of the disabled, is reflected in the concept of social support (Bak Ja-Gyeong, Kim Jong-Jin, Kang Yong-Joo, 2010)<sup>2</sup>. Social support is a useful social resource based on human nature and can be defined as a useful social resource that can ultimately help improve the quality of life, information, and physical aids that can be obtained from interaction with various people in the environment, such as the environmental system, and the qualitative and informative assistance of the individual (Lee Byeong-Hwan, 2006)<sup>3</sup>. However, social support should be viewed as a major conceptual concept in which the participation of the disabled should be prioritized, and that the network of networks and information will be viewed as a major conceptual concept in which the network, participation and equity benefits are advantageous (Bak Gil-Seong, 2002)<sup>4</sup>. According to the study, it emphasizes the importance of understanding the multidimensional relationship of social support with the subjective perception of social support (Nam Yeon-Hee, 2001)<sup>5</sup>. Social support has been shown to be an important variable, as well as an important factor in the development of social networks and the formation of social networks. (ImJeong-Gi, 1999)<sup>6</sup>. In recent years, the importance of social participation and network of persons with disabilities have been emphasized due to changes in the paradigm of the welfare of the disabled, and this has increased 'social capital' from recent interest in social welfare practice. The primary concern for social capital is the attempt to effectively link and integrate various resources at the community level, but another concern from the welfare perspective is the effect of the individual-level social capital (Porter, 2000)<sup>7</sup>. By expanding the social capital of individual welfare and alleviating the "social exclusion from social capital" factors that affect the disabled's quality of life for is believed to improve the state of welfare. Social exclusion is a mechanism to isolate a group from society's mainstream (Giddens, 2000)<sup>8</sup>, and social exclusion is inevitably linked to issues with 'participation'. Therefore, expansion of social capital with relational attributes, such as network and participation, will have a positive effect on the disabled people's quality of life (Lee Jeong-Kyu, 2009)<sup>9</sup>, which is expected to show a "developing" aspect to improving quality of the disabled. This study is determined to find how disability characteristics and socioeconomic status affect social capital, and to contribute to established policies so that the social capital can expand to improve the quality of life of those who are disabled.

## II. MATERIALS AND METHODS

This study used the secondary data collected from the survey panel of the Disabled (persons for the Disabled).

The employment panel for disabled persons was used to directly use or process the variables needed for the research from the secondary panel for the purpose of representing the disabled persons. Additionally, the stratified characteristics of persons who can represent the attributes of the registered persons can be divided into regions of the region, and the scope of the breakdown is subdivided into stratified brackets, and stratified by geographical categories, and stratified brackets, and stratified stratification and stratification, and stratification in the category of stratified brackets. In total, the study found that the number of people who were successful in the study was comprised of 4,677 persons, categorized by the economic activity status of gyeongje, and the number of people who are unemployed and unemployed, and 182 people are classified as 2619, and the number of people with disabilities is 2,017 and 2,660.

### A. Survey data

Wherever necessary provide (citation) For this study, the second year data from the 2009 Panel Survey of Employment for the Disabled was used to for analysis. For this study, 4,677 research subjects were used, which was further classified into their economic activity: 1,876 employed, 182 unemployed, 2,619 non-workers. 2,017 people were classified with severe disabilities and 2,660 people was classified with mild disabilities.

## **B. Statistical analysis**

In this study, the characteristics of the disabled and socioeconomic status factors are independent variables, while the social capital is the dependent variable. Among the independent variables, subordinate factors of the disability included the degree of disability, type of disability, and activity characteristics. Of the aforementioned disability was measured by the disability grade 1-6 as stipulated in the Welfare for Disabled Persons Act. Furthermore, among the 15 disability types, it integrates external physical disability, sensory disturbances, and internal physical disability to physical disabilities, as well as integrating mental disorders, intellectual disabilities, and autistic disorders. Disability was analyzed in two dimensions. Within the independent variables, the 3 sub factors of socioeconomic characteristics include education, income and economic activity status. Educational attainment was determined by the number of years of education. The report analyzes the socio-economic status of the disabled person in relation to the condition of the disabled, including the status of the disabled and the disabled (KimSeong-Hee et al, 2011)<sup>10</sup>. In addition, the dependent variable, social capital consists of network, participation, and reciprocity. A Multiple Regression statistical analysis was performed with SPSSWIN 21.0 to analyze the relationship between disability characteristics and social capital. The three disability variables are grade, activity characteristics, and disability type.

## **III. RESULTS AND DISCUSSION**

Multiple regression analysis was performed to examine the impact of disabled characteristics and socioeconomic status on social capital. The analysis consisted of three models, where the model 1 included disabled characteristic variables to analyze the impact of disability characteristics on social capital. The three disability characteristic variables are the grade of disability, activity characteristics, and type. The reference variable is the mental disorder, and the dummy variable is converted into physical external disorder and sensory disorder. In model 2, socioeconomic status variables are utilized to analyze the impact of socioeconomic status on social capital. The three socioeconomic status variables are the level of education, monthly average income, and employment status. The final education level is converted into the dummy variable for graduations of elementary, middle, and high school, as well as temporary employment, self-employed, and employer. The effects of these variables are compared and analyzed. Model 3 compared the independent characteristics and socioeconomic variables in model 1 are analyzed simultaneously before the control variables. The subdivision of the main variables related to disability characteristics and socioeconomic was done to understand specific effects of each variable on social capital and quality of life.

### **A. The Effect of Disability Characteristics and Socio-Economic Status on Networks**

The results of the multiple regression analysis on the effect of disability characteristics and socioeconomic status on the network are the factors of social capital are shown in Table 1. First, the results of the disabled characteristics of model 1 reveal the effect of disabled characteristics on network is a large 64.8% ( $R^2=.648$ ,  $F=1718.563$ ,  $p<.001$ ). Behavioral characteristics is the greatest ( $\beta=.678$ ), and the effect of disability type and disability level are also significant. Disability types, external physical disabilities, sensory disorders, and internal disabilities have greater levels of networking than mental disorders with external disturbances. Similarly, model 2 socioeconomic status had a 21.8% effect on network ( $R^2=.218$ ,  $F=144.672$ ,  $p<.001$ ). There was no significant effect of disabled characteristics, but there is relatively high power. For socioeconomic status, employment status and monthly average income of final educational background are high, but in terms of employment status, employment level of employees are relatively higher than that of unemployed. In educational level, the greatest effect in high school graduates. In model 3, both disability and socioeconomic status was used, and showed a 69.0% explanatory power ( $R^2=.690$ ,  $F=735.690$ ,  $p<.001$ ). Overall, the effect of disability characteristics did not change greatly, but effect of socioeconomic status was less than the 2 level analysis with just socioeconomic status. Even after controlling the socioeconomic status, active characteristics have the greatest explanatory power ( $\beta=.633$ ) and the effects of type and disability grade are similar. This result implies that a difference exists in the effect of socioeconomic status on the network according to the disabled characteristics.

The socioeconomic status of the disabled has a direct effect on the network, suggesting a possible indirect effect on the network of disabled characteristics. Results from multiple regression analysis on the effect on network are shown in Table 1.

Table 1: Results from Multiple Regression Analysis on the Effect on Network

network division	Model 1			model 2			model 3		
	Non-standardization factor		Standardization factor	Non-standardization factor		Standardization factor	Non-standardization factor		Standardization factor
	B	Standard error	$\beta$	B	Standard error	$\beta$	B	Standard error	$\beta$
constant	-1.007*	.058		3.067	.042		-1.065	.059	
Disability grade	.097	.007	.140				.072	.007	.104
Type of disability									
physical disability	.810	.038	.351				.764	.036	.331
Sensory disorder	.506	.041	.192				.455	.039	.173
Internal organ disorder	.681	.051	.155				.676	.048	.154
Active characteristic	.891	.013	.678				.831	.013	.633
Final education									
elementary				.479	.048	.190	.222	.030	.088
Primary school				.472	.051	.167	.271	.032	.096
High school				.572	.048	.233	.388	.030	.158
College degree or higher				.699	.068	.165	.461	.043	.109
Monthly income				.043	.007	.090	.020	.004	.042
Employment status									
Commercial				.896	.052	.246	.360	.033	.099
temporary				.809	.043	.250	.292	.028	.090
self-employment				.885	.048	.247	.315	.031	.088
employer				.894	.134	.087	.338	.085	.033
Statistical verification	R <sup>2</sup> =.648 F=1718.563 p=.000			R <sup>2</sup> =.218 F=144.672 p=.000			R <sup>2</sup> =.690 F=735.690 p=.000		

**B. Impact of Disability Characteristics and Socioeconomic Status on Participation**

The impact of disability characteristics and socioeconomic status on participation of components of social capital are analyzed. In model 1, explanatory power of disabled characteristics on network was 68.1% ( $R^2 = .681$ ,  $F = 1993.420$ ,  $p < .001$ ) ( $B = .737$ ), and effects of disability type and level are all significant. Effects of disability type are relatively greater than level. For the types of disability, external participation in the physical disability, sensory disturbance and internal disability were greater than mental disorders. In model 2, the socioeconomic status also had a significant effect on participation with 18.8% power ( $R^2 = .188$ ,  $F = 120.226$ ,  $p < .001$ ).

Compared to monthly average earnings, the difference between employment status and final academic achievement is greater.

For employment status, the level of participation is higher in employed than unemployed, and differences are found in the occupations of the employed. In model 3, both disabled characteristics and socioeconomic status were applied ( $R^2 = .706$ ,  $F = 794.695$ ,  $p < .001$ ), and power was 70.6%. Overall, the effect of socioeconomic status is lower than the results of model 2 analysis, which only used socioeconomic status. After controlling for socioeconomic status, active characteristics revealed the greatest power between all independent variables ( $\beta = .702$ ), and the effects of disability type and grade are similar to those of disabled characteristics. Nonetheless, the effect of employment is reduced and the power is less than the effect of educational background. These results confirm that the effect of socioeconomic status on network is dependent on the characteristics of the network.

However, the decrease in independent effect of employment status among the socioeconomic status variables is more significant than the results of the network analysis, implying that constraints from the characteristics of the disabled can be greater in expanding participatory social capital despite employment. Results of multiple regression analysis on participation are shown in Table 2.

Table 2: Multiple Regression Analysis of the Effect on Participation

Participation division	Model 1			model 2			model 3		
	Non-standardization factor		Standardization factor	Non-standardization factor		Standardization factor	Non-standardization factor		Standardization factor
	B	Standard error	$\beta$	B	Standard error	$\beta$	B	Standard error	$\beta$
constant	-.910*	.055					-.961	.057	
Disability grade	.074	.007	.108				.054	.007	.080
Type of disability									
physical disability	.584	.035	.257				.548	.034	.241
Sensory disorder	.428	.039	.165				.388	.038	.150
Internal organ disorder	.419	.048	.097				.414	.046	.096
Active characteristic	.951	.0012	.737				.905	.012	.702
Final education									
elementary				.456	.048	.184	.210	.029	.085
Primary school				.426	.068	.154	.234	.031	.084
High school				.484	.052	.200	.305	.029	.126
College degree or higher				.584	.043	.140	.354	.041	.085
Monthly income				.035	.007	.073	.011	.004	.024
Employment status									
Commercial				.825	.052	.230	.270	.032	.075
temporary				.797	.043	.251	.251	.027	.079
self-employment				.832	.048	.237	.247	.030	.070
employer				.794	.134	.079	.245	.081	.024
Statistical verification	R <sup>2</sup> =.681 F=1993.420 p=.000		R <sup>2</sup> =.188 F=120.226 p=.000			R <sup>2</sup> =.706 F=794.695 p=.000			

### C. Impact of Disability Characteristics and Socioeconomic Status on Reciprocity

The model 1 power is 65.7% and the effect of the disability characteristics on reciprocity ( $R^2=.657$ ,  $F=1794.781$ ,  $p<.001$ ) shows the greatest effect of active characteristics ( $\beta=.657$ ), similar to the analysis of network and participation. However, the effect of the disability grade is relatively large compared to the types, which is different from the results of network and participation. Of course, the level of reciprocal externality and sensory disturbances is higher than mental disorders, but is weaker than the effects of network or participation, and low compared with the effect of disability grade on reciprocity. The model 2 power is 16.6%, which is lower than the first model. Socioeconomic status as a whole has a significant effect of participation ( $R^2=.166$ ), and the employment status and income are greater than the final education level. For employment, the level of participation is greater than the unemployed, and the greatest difference exists between high school and non-high school graduates. Model 3 has a 67.2% power, which was the greatest power. In model 3, the effect of disability characteristics did not change significantly ( $R^2=.672$ ,  $F=677.145$ ,  $p<.001$ ), but socioeconomic status was greatly reduced compared to model 2 analysis with just socioeconomic status. After controlling socioeconomic status, active characteristics had the greatest power among all independent variables ( $\beta=.682$ ), and the disability type and level remained similar to the analysis of disabled characteristics.

Nonetheless, the socioeconomic status effect reduced significantly, and the effect of final education declined the most. The analyzed results reveal a difference between socioeconomic status of the network and characteristics of the disability network. In contrast to the network and participation analysis, the effect of disability grade is relatively larger than the type of disability, and the independent effect of socioeconomic status is relatively smaller due to the nature of reciprocity. This is due to the high degree of relationship based on norms or behavioral factors like maintaining trust or mutual relationships with opponents, and not

the amount of socioeconomic resources. Multiple regression analysis on effects of reciprocity are shown in Table 3.

Table 3: Multiple Regression Analysis on Effects of Reciprocity

reciprocity division	Model 1			model 2			model 3		
	Non-standardization factor		Standardization factor	Non-standardization factor		Standardization factor	Non-standardization factor		Standardization factor
	B	Standard error	$\beta$	B	Standard error	$\beta$	B	Standard error	$\beta$
constant	-1.644*	.068		3.150	.051		-1.563	.072	
Disability grade	.130	.008	.159				.107	.008	.132
Type of disability									
physical disability	.182	.044	.066				.147	.044	.054
Sensory disorder	.293	.048	.094				.238	.048	.076
Internal organ disorder	.108	.059	.021				.125	.059	.024
Active characteristic	1.101	.015	.710				1.057	.015	.682
Final education									
elementary				.293	.058	.099	.018	.037	.006
Primary school				.230	.062	.069	.022	.039	.007
High school				.235	.058	.081	.040	.037	.014
College degree or higher				.258	.083	.051	.019	.053	.004
Monthly income				.059	.008	.104	.028	.005	.049
Employment status									
Commercial				.936	.063	.218	.268	.041	.062
temporary				.992	.053	.260	.313	.035	.082
self-employment				1.001	.059	.238	.310	.038	.073
employer				.825	.164	.069	.226	.103	.019
Statistical verification	R <sup>2</sup> =.657 F=1794.781 p=.000			R <sup>2</sup> =.166 F=103.079 p=.000			R <sup>2</sup> =.672 F=677.145 p=.000		

#### IV. CONCLUSION

According to the results, the disability characteristics and socioeconomic status have significant effects on all three components of social capital. The multiple regression analysis on impact of disability and socioeconomic status on network among the components of social capital revealed that the disabled characteristics have a significant influence on network ( $R^2=.648$ ,  $F=1718.563$ ,  $p<.001$ ). Particularly the characteristics of disabled, the effect of activity characteristics is the greatest, and the level of mental disorder is the lowest among the types of disability ( $\beta=.678$ ). Therefore, it suggests that specialized services should be provided to increase the network level for the mentally handicapped. Socioeconomic status also had a significant effect of the network ( $R^2=.218$ ,  $F=144.672$ ,  $p<.001$ ). Although it does not reach the effect of the characteristics of the disabled, it shows a high power in employment status, education period, and monthly income. Therefore, socioeconomic status of handicapped had a significant indirect effect on network. For participation in social capital, the independence effect of employment status among the socioeconomic status variables of the disabled reduced more than the analysis result of the network. Therefore, this is implying that the constraints from disabled characteristics of disability can be greater in expanding participatory social capital despite employment. For analysis of network and participation, the effect of socioeconomic status on reciprocity revealed a difference depending on the characteristics of the disability. Thus, the results of this study reveal that the lowest result is obtained in all variables of social capital in the case of the mentally handicapped, hence seeking a method to support the vulnerable mentally handicapped to social capital formation is recommended. Furthermore, the level of 'network' was found to be mainly in the private network. Specifically, to revitalize official networks like employment, it is urgent to providing a policy that support stable employment. Employment is the most effective method to expanding a network and participation, because in addition to generating an income, occupations fulfills basic human social needs

through the formation of relationships and contributes to increased opportunities for resource acquisition.

Participation in leisure activities has a great influence on the quality of life, more specifically the participation of leisure and rest activities on social capital of disabled people. Therefore, it is necessary to provide a policy that supports the expansion of leisure and relaxation activities for the disabled. However, this study has limitations, social capital variables were collected by using the indicators of 'Activity and Participation' in ICF, but it was not self-report, and there are many number of question and errors in measurements. It is imperative to analyze the regional characteristics like urban, small cities, and rural areas to clarify the characteristics of social capital. In terms of social capitals, it is expected that the level of resource acquisition will be different according to the regional characteristics. Therefore, analyzing the impact on social capital, and a support strategy for each type of community should be established.

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## The Effect of Work Environment on Job Satisfaction of Disabled Workers-Comparison of Regular and Irregular Workers

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### Abstract---

**Background/Objectives:** The purpose of this study is to analyze the factors that affect job satisfaction of disabled workers with factors divided into the work environment factor, disability characteristic factor, consideration of disability, and discrimination working environment.

**Methods/Statistical Analysis:** For this study, the 7th year data collection from the 2014 Panel Survey of Employment for the Disabled was used. Among the surveyed, 1,002 workers were subjects for this study. A Multiple regression analysis was used to determine job satisfaction and was completed with SPSSWIN 21.0 after selecting necessary variables among the data.

**Findings:** The main findings are the following. First, most of the factors related to work environment have a meaningful effect of job satisfaction, especially factors in combination with disability-related considerations and discriminatory factors have a distinct impact on job satisfaction. Second, the effect of work environment, which include considerations of disability and discrimination, is more effective than negative experience like convenience facilities and physical condition or discrimination. The effect of the positive psychological factor of understanding and accepting the disability of the workplace is greater. Third, the results of the factors affecting job satisfaction show little difference between the types of employment of regular and irregular workers.

**Improvements/Applications:** This study suggests improving the objective working conditions to increase job satisfaction of irregular workers with disabilities, and poor, objective working environment.

**Keywords---** Employees with Disabilities, Job Satisfaction, Working Conditions, Work Environment, Regular and Irregular.

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## I. INTRODUCTION

Job satisfaction of disabled workers have been an indicator of successful social adjustment for those with disabilities and a basis for the achievement of vocational rehabilitation. Job satisfaction has a significant meaning in the welfare of the disabled because it reveals the employee's happiness and life satisfaction<sup>1-6</sup>. According to established studies, job satisfaction refers to the inclusion of both positive and negative feelings, including experience, status, attitude, and their subjective state in the interaction of individuals and their surrounding environments in the context of the tasks involved in the task (Yeom Dong-Mun et al, 2013)<sup>7</sup>. The job satisfaction of workers is directly related to the task (work) and directly related to the indirect functions, the related factors are characterized as complex dimensions (Milton, 1981)<sup>8</sup>. Initial studies on the relevance of existing disorders and duties to task satisfaction tend to accentuate subjective cognitive factors such as perceived impairment levels rather than objective failures (Choi So-Yeon, 1993)<sup>9</sup>. On the other hand, the difference between regular and non-regular workers is different from those of regular workers, according to a separate study by the private sector and the objective of the non-regular workforce (Ju Seok-Jin, Han Sang-Deok, 2010)<sup>10</sup>.

For this study, we analyzed the factors affecting job satisfaction, focusing on the characteristics of work environment related to the disability, and to compare the effect of working environment on regular and irregular workers on job satisfaction. The regular and irregular workers of Korean labor market are representative types of work that lead to a difference in job satisfaction, which also suggest a possible qualitative difference in those workers. This is supported by prior studies which showed an effect of job satisfaction for regular and irregular workers. Especially in poor working condition or environment, there is a high possibility of impact of employment stability on job satisfaction. Therefore, the purpose of this study is to determine the sustainability of the employment for the disabled by examining how the factors that affect job satisfaction are different between regular and irregular workers, and clarify the effects of specific working environment.

## II. MATERIALS AND METHODS

### A. Survey Data

For this study, the 7th year data collection from the 2014 Panel Survey of Employment for the Disabled was used. The panel survey was conducted from May 20, 2014 to July 31, 2014, where 4,082 people aged between 21 to 81 years were surveyed. Among the surveyed, 1,002 workers were subjects for this study. Most of the data was collected by direct responses by disabled persons, but some representative responses were included.

### B. Statistical Analysis

Factors affecting job satisfaction are classified as disability characteristics, general work environment factors, and working environment factors. In addition, demographic factors of gender and age are considered control factors. The characteristics of disability are composed of disability level and disability type, and general working environment factors are fitness of regular workers, mental and physical labor, income, size of business, and work completed. Disability related work environment factors include discrimination, job related experience, comprehension and acceptance of workplace disability, and availability of facilities for disabled. A Multiple regression analysis was used to determine job satisfaction and was completed with SPSSWIN 21.0 after selecting necessary variables among the data.

## III. RESULTS AND DISCUSSION

Disability related characteristics were divided into these 4 classes depending on the degree of the disability: internal disability, sensory disturbance, mental disorder, and internal disability by type. Job care in the workplace was divided into 3 categories: 1) care needed and considered, 2) care required but not considered, 3) no care necessary. The number of convenience facilities installed in the workplace in measured, and because discrimination in the workplace is an experience of discrimination, it is not in the category of discrimination, so the degree of understanding and acceptance of the disabled in workplace was classified into 1) low, 2) normal, 3) high. The working environment variables were regular and irregular workers, physical and mental labor, regular/temporary/daily workers, monthly income, business size, job suitability (suitability and not suitable) were measured.

**A. Job Satisfaction of the General Working Environment**

The difference in job satisfaction between regular and irregular workers is large. According to commercial and temporary work types (Job satisfaction average; 3,25), temporary employment (3.12), and daily employment (2.86), more specifically in daily employment had low job satisfaction. Further, full time employees (3.11) had higher job satisfaction than part-time employees (3.04). These results show that job stability and sustainability are related to job satisfaction. According to labor characteristics, job satisfaction in physical labor is lower than mental labor (Mental labor 3.41, Physical labor 3.02). For the general public, job satisfaction of physical labor tends to be lower than mental labor, but considered that physical limitation of persons with disabilities is a result of significant decrease in job satisfaction. A cross between full time, irregular workers and physical/nonphysical labor to shape is manual labor. When the four types are compared, regular mental labor (3.47), irregular mental labor (3.31), irregular physical labor (3.16), and irregular physical labor (2.95) show statistical significance. The results show that physical/mental labor and regular/irregular employment styles interact with each other to affect job satisfaction. On the other hand, there are also differences in job satisfaction according to organizational size. Job satisfaction is slightly lower than 49 subjects according to business size, but there not a significant difference between a business with more than 50 employees, less than 999 employees, and more than 1000 employees. Although job satisfaction for 49 employees is slightly lower (3.02), there is no significant difference between the 50 and 999 employees (3.22) with 1000 employees, therefore size of the business does not significantly increase job satisfaction. The degree of suitability between the job and aptitude is a significant factor for the gap for job satisfaction. Work suitable for the disabled had a significantly higher job satisfaction (3.18) than not suitable work (2.88). Among the general job environmental factors, the gap between physical and mental labor show the greatest difference. As expected higher the income, the higher the job satisfaction. Results of job satisfaction from general working environment are shown in Table 1.

**Table 1: Job Satisfaction from General Working Environment**

Contents	division	Job Satisfaction Average
Regular workers & Irregular work	Regular workers	3.27
	Irregular work	3.00
	F Verification	74.42**
Physical Labor & Mental labor	Physical Labor	3.02
	Mental labor F Verification	3.41
		124.20**
Regular workers/ Irregular workers & Physical labor /Mental labor	Physical / Regular (1)	3.16
	Mental / Regular (2)	3.47
	Physical / Irregular (3)	2.97
	Mental / Irregular (4)	3.31
	F Verification	54.56**
	Post-verification	(1)-(2)-(3)-(4)
Commercial	Commercial (1)	3.25
	temporary (2)	3.12
	Daily use (3)	2.86
	F Verification	58.98**
	Post-verification	(1)-(2)-(3)
Full time & Part time	Full time	3.11
	Part time	3.04
	F Verification	3.79*
Earned income(Monthly average)	~ 1,000,000 (1)	2.99
	1,000,000 ~1,990,000 (2)	3.10
	2,000,000~ (3)	3.29
	F Verification	27.52**
	Post-verification	(1)-(2)-(3)
Business scale	~49 people (1)	3.02
	50 ~999 people (2)	3.22
	1000 people ~(3)	3.24
	F Verification	23.71**
	Post-verification	(1)-(2)(3)
Aptitude fitness	Suitable	2.88
	Not suitable	3.18
	F Verification	78.60*

\*p<0.05, \*\*p<0.01

**B. Job Satisfaction by Disability Characteristics**

When differences in job satisfaction by disability level and type are compared, the severely disabled (3.17) showed higher satisfaction with job than the mildly disabled (3.08).

In the previous panel analysis, high job satisfaction of the severely disabled was found, and the cause will be analyzed in the following analysis. Among the four types of disabilities (external, sensory, mental and internal disability) job satisfaction of the physically impaired are highest (3.36), and external disorder (3.11), sensory disorder (3.07), and mental disorder (3.08) showed similar job satisfaction. Results of job satisfaction by disability characteristics are shown in Table 2.

Table 2: Job Satisfaction by Disability Characteristics

Contents	division	Job Satisfaction Average
Level of disability	Severe	3.17
	Mild	3.08
	F Verification	7.65**
Type of disability	External physical(1)	3.11
	Sensory disorder (2)	3.07
	Mental disorder (3)	3.08
	Internal disability (4)	3.36
	F Verification	4.70**
	Post-verification	(1)(2)(3)-(4)

\*p<0.05, \*\*p<0.01

**C. Job Satisfaction by Disability Related Working Environment**

The difference of job satisfaction due to the work environment related to disability is described below. When job satisfaction with disability facilities at work, discrimination at work, disability understanding and acceptance at work are compared, the effects of receiving or not receiving care when care was needed revealed a difference on job satisfaction. There was no difference in job satisfaction for the disabled who do not need special care and those who do (3.23 and 3.11, respectively). The disabled that do not receive care even though they need care have lower job satisfaction than the two mentioned above (2.90). This implied that the care factor is negative than positive. Disabled workers who have experienced discrimination showed low job satisfaction. The overall acceptance and comprehension of workplace disability among disability related work environment factors are the biggest gaps in job satisfaction. In addition, the disabled people at the workplace with facilities for the disabled (3.29) have higher job satisfaction than the disabled persons at the workplace without disability facilities (3.05), and the overall comprehension and acceptance of the disabled in the workplace revealed high job satisfaction. The results showed that discrimination and care in the working environment had a significant influence on job satisfaction. Furthermore, a positive effect on job satisfaction was found depending on the climate and atmosphere of the workplace, understanding their disabilities and institutional factors, and the facilities or care experience for the disabled. Results of job satisfaction by disability related working environment are shown in Table 3.

Table 3: Job Satisfaction by Disability Related Working Environment

Contents	division	Job Satisfaction Average
Caring experience	Considered (1)	3.23
	No consideration (2)	2.90
	Not required (3)	3.11
	F Verification	11.06**
	Post-verification	(1)(3)-(2)
Disabled facilities	exist	3.29
	not exist	3.05
	F Verification	46.29**
Discrimination experience	yes	3.01
	no	3.12
	F Verification	9.16**
Disability acceptance	low (1)	2.46
	middle (2)	3.04
	high(3)	3.56
	F Verification	168.381**
	Post-verification	(1)-(2)-(3)

\*p<0.05, \*\*p<0.01

**D. Analysis on Job Satisfaction of Regular and Irregular Workers on Job Types**

The analysis results of regression analysis of disability and discrimination in the workplace on job satisfaction for general working environment factors of full time/regular workers and irregular/unskilled workers are shown below. First, between the power of the whole model, 44.3% for regular workers was not significantly different than 43.8% irregular workers. However, there is a difference in power among the models. The power of disability consideration and discriminatory factors (Model II) and the power of general work environment factors and disability characteristic (Model I) are significantly large in irregular workers. Job satisfaction of regular workers is influenced by the disability and discrimination factors in the workplace, whereas irregular workers had a greater influence on job satisfaction than the general working environment. More specifically, job satisfaction of irregular workers was more influenced by the general work environment factors than the regular workers, and income, business size, and suitability was more effective. In addition, the variables on job satisfaction was maintained constantly regardless of job disability, discrimination, and disability characteristics. On the contrary, regular workers with disabilities, mental labor, high suitability, and income greater than 2 million Won had high job satisfaction, but not as effective as irregular workers, and the effect was greatly reduced in Model III, which is applied to disability care and discrimination of the workplace. The independent effect of general work environment factors on irregular workers was greater than regular workers because irregular workers had a relatively poor income or work stability, and the effect of sequence and difference on job satisfaction is greater in these factors. Following, the effects of disability awareness and discrimination on job satisfaction was most significant for both regular and irregular workers. However, there were differences between the two groups in the effects of other factors. Workplace care on job satisfaction had a significant effect in regular workers, and is maintained even after controlling general work environment. However, experience for irregular workers of discrimination and effects of facilities for disabled were found in Model II, and independent effects of these factors were not significant in Model III, which included the general work environment factors and disability characteristics. Therefore, regular workers have a positive influence on job satisfaction, convenient and institutional facilities, whereas irregular workers are influenced by negative experiences like discrimination. Job satisfaction of the severely disabled was significantly higher in irregular workers, whereas regular workers showed a significant difference in job satisfaction in mental and internal disabilities. However, the effect demographic factor like gender factors is significant only in irregular workers.

Nonetheless, job satisfaction in regular workers can be lowered in older age groups. This is likely due to the negative factors in the performance of older workers like occupational stability and salary are high in older, regular workers. Results of multiple regression analysis for job satisfaction (Regular Employee) are shown in Table 4,5

Table 4: Multiple Regression Analysis for Job Satisfaction (Regular Employee)

variable	Model I		Model II		Model III	
	b(β)	VIF	b(β)	VIF	b(β)	VIF
Sex Male	-.078(-.068)	1.195	-.043(-.038)	1.030	-.061(-.054)	1.249
Age ~59 years	-.012(-.013)	1.323	-.027(-.029)	1.272	-.041(-.044)	1.368
Age 60 years~	-.167(-.136)**	1.342	-.194(-.159)**	1.284	-.148(-.121)**	1.363
Mental labor	.202(.208)**	1.250			.130(.134)**	1.321
Income 100~200	.068(.063)	2.937			.079(.085)	2.945
Income 200~	.154(.165)*	3.705			.114(.121)*	3.732
Employed employees 50-999people	.062(.060)	1.213			.058(.056)	1.289
1000 people~	.134(.120)*	1.229			.083(.075)	1.318
Aptitude fitness	.113(.095)*	1.073			.059(.049)	1.091
Severe	.068(.063)	1.259			.049(.046)	1.314
External physical	.055(.052)	7.631			.081(.083)	7.998
Sensory disorder	.055(.052)	7.866			.090(.086)	7.183
Internal disability	.254(.106)*	2.392			.314(.131)*	2.446
No-discrimination experience			.072(.047)	1.078	.066(.055)	1.145
Work consideration exists			.208(.114)*	2.038	.208(.114)*	2.138
Business consideration _ neutral			.195(.142)**	2.091	.182(.133)*	2.131
facilities _ Yes			.101(.101)*	1.102	.044(.044)	1.300
Disability acceptance_low			-.454(-.221)**	1.113	-.445(-.217)**	1.142
Disability acceptance_high			.481(.480)**	1.135	.448(.447)**	1.175
Constant	3.014**		2.651**		2.675**	
Modified R2	.240**		.403**		.443**	

\*p<0.05, \*\*p<0.01

Table 5: Multiple Regression Analysis for Job Satisfaction (Irregular Employee)

variable	Model I		Model II		Model III	
	b(β)	VIF	b(β)	VIF	b(β)	VIF
Sex Male	-.094(-.096)*	1.249	-.053(-.054)	1.028	-.090(-.093)**	1.276
Age ~59 years	.011(.011)	1.336	.041(.040)	1.265	.011(.011)	1.349
Age 60 years~	.069(.072)	1.289	.032(.033)	1.258	.052(.055)	1.304
Mental labor	.252(.173)**	1.091			.217(.148)**	1.136
Income 100~200	.122(.133)**	1.292			.137(.150)**	1.332
Income 200~	.126(.078)*	1.249			.134(.083)*	1.272
Employed employees 50-999people	.103(.073)*	1.073			.065(.046)	1.091
1000 people~	.136(.118)**	1.079			.096(.083)*	1.119
Aptitude fitness	.175(.176)**	1.072			.139(.140)**	1.111
Severe	.151(.149)**	1.317			.124(.122)**	1.378
External physical	.076(.082)	5.434			.053(.058)	5.492
Sensory disorder	.052(.053)	5.106			.043(.043)	5.143
Internal disability	.159(.071)	1.701			.144(.064)	1.731
No-discrimination experience			.033(.054)*	1.041	.036(.031)	1.141
Work consideration exists			.055(.032)	1.654	.047(.027)	1.694
Business consideration _ neutral			.086(.072)	1.640	.063(.053)	1.708
facilities _ Yes			.104(.087)*	1.097	.030(.025)	1.183
Disability acceptance_low			-.578(-.400)**	1.081	-.544(-.377)**	1.105
Disability acceptance_high			.422(.342)**	1.074	.382(.310)**	1.114
Constant	2.749**		2.895**		2.675**	
Modified R2	34.7**		35.6**		43.8**	

\*p&lt;0.05, \*\*p&lt;0.01

#### IV. CONCLUSION

Until now, some analytical models have set job satisfaction of disabled workers with general factors of work environment, disability characteristics, disability consideration and discrimination, then analyzed these effects. Main findings and policy implications are summarized below. First, factors related to the general working environment have a significant effect on job satisfaction, and simultaneously, these factors have different effects on job satisfaction in combination with care for disability and discrimination factors. Among the general working environment, significant independent effects the mental and physical work satisfaction according to the suitability of the job, and there isn't a great difference in job satisfaction according to salary and size of the business. However, effects of different factors and job satisfaction on each factor revealed a slight change. The fit of mental labor or work is less effective after controlling for disability characteristics or discrimination, but income was largely retained. The relation between mental and physical labor with work aptitude fitness and job satisfaction revealed subjective feelings like boredom or joy, and the effects of income or the size of the business on satisfaction gave more objective and rational factors like economic compensation or job stability. The positive and disabled working environment without disability care and discrimination can reduce negative meaning or feeling about work and increase job satisfaction. However, positive working environment for the disabled does not affect the satisfaction with job compensation. In other words, job satisfaction of disabled persons is somewhat independent and existed in terms of instrumental aspects derived from rational compensation like promotion, stability, salary, and rewards of work itself. In addition, measures that create a caring environment for disabled people or eliminating discrimination in the workplace contribute to the improvement of low job satisfaction which is due to difficulties or negative feelings towards the job, and suggests that objective conditions of employment do not significantly contribute to overcoming the poor working environment. Second, the work environment related to disability care and disability greatly explains the variation of job satisfaction, which is greatly influenced by understanding or accepting the disabled. This should be the basis to show that positive situation and atmospheres like culture and climate of the workplace has a continuing effect on job satisfaction for the

disabled and also suppresses negative factors like discrimination. In addition, work environment factors regarding the care and discrimination don't significantly affect the disparity of job satisfaction according to the type of disability, which suggests that care for disabled needs improvement in consideration of disabled characteristics and types. Third, it was shown that a few differences affecting the job satisfaction according to the types of employment of regular and irregular workers existed. Both irregular and regular workers are concerned about the disabled and eliminating discrimination at work, which improves workplace accommodation and satisfaction, but the effect is large in regular full-time jobs. Direction of measure suggests that the focus should be on improving objective condition to deal with irregular workers with occupational instability and poor objective working conditions.

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## Factors Influencing Depression in Middle-age Women in South Korea

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### Abstract---

**Background/Objectives:** This present descriptive study to figure out the factor that influence on middle-aged women's depression.

**Methods/Statistical Analysis:** The study subjects are 200 middle-aged women who reside in C area and M area, and data-collection was done in period from November 1st 2015 to November 30th 2015. The collected data were analyzed through t-test, ANOVA, Pearson's correlation and Stepwise multiple regression analysis.

**Findings:** As a result of the study, in relation between depression of middle-aged women and related variables, menopausal symptom ( $r=.485$ ,  $p<.001$ ) appears correlation of significant quantity, social support ( $r=.485$ ,  $p<.001$ ), self-efficacy ( $r=-.330$ ,  $p<.001$ ) appear correlation of minus.

**Improvements/Applications:** Therefore, self-efficacy promotion plan is required in order to relieve menopausal symptom to reduce depression of middle-aged women.

**Keywords---** Middle Age, Women, Depression, Menopausal Symptom, Self-Efficacy.

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## I. INTRODUCTION

### A. *Need for the Study*

In a survey by the Ministry of Health and Welfare in 2013, it was found that women experienced 8.8% more depressive symptoms than men in the survey of whether they had felt sadness or desperation to the point it affected daily life for two more consecutive weeks within 1 year<sup>1</sup>. Also in the United States, depression in middle-aged women was 1.7 times higher than in men<sup>2</sup>. By age, over 70s experienced the most depressive symptoms, followed by 50s and 60s<sup>1</sup>.

These results suggest that a variety of approaches are needed to ensure that middle-aged women, at the stage of transition to old age in human development stages, can prepare for a healthy and productive senescence.

Generally, middle-aged is between 40 and 65 years old, and Erikson stated that if one succeeds in mid-life psychosocial task of succeeding professionally and domestically, giving birth and raising children, leading the future, and improving society, one obtains generativity. He also stated that if this fails, stagnation comes where one can not feel the rest of life worth living, can not prepare for the future, and the middle life crisis comes<sup>3</sup>.

In particular, middle-aged women experience menopause and menopausal symptoms due to female hormone changes<sup>4</sup> and child's independence, spouse retirement, role change, and psychological changes such as lack of self-identity, life stress, anxiety, and depression occur<sup>5</sup>. More than 38% to 39% of Korean middle-aged women experience menopausal symptoms<sup>6</sup>, and menopausal symptoms include facial flushing, night sweats, genitourinary problems, depression, changes in cognitive function, sleep disorders, and urinary incontinence<sup>7</sup>.

Thus, depression in middle-aged women is associated with physical and physiological changes<sup>7</sup>, and it appears due to anxiety about these changes, role conflicts on child independence, sense of deprivation, loss of self-identity, and crisis of self-consciousness<sup>8</sup>. It was stated that in middle-aged women, the higher the stress of family, economy, health, and role, the higher the depression, and the higher the social support, the lower the degree of depression<sup>9</sup>.

Social support such as family functions is also reported as an important factor in depression in middle-aged men<sup>10</sup>.

Among the roles of the middle aged who are in the center of leading the society and the family, the social environment factors such as excessive responsibility including the support of the children and the parents are also important factors in middle-aged depression<sup>11</sup>.

Thus, it can be seen that the depression of middle-aged women is related to a combination of psychological and psychological factors, and is closely related to social support and menopausal symptoms<sup>8,12</sup>.

Therefore, for middle-aged women, there needs to be consideration of their current state of health because they are in the process<sup>13</sup> of experiencing physical and psychological changes due to menopause, menopausal symptoms and life-event stresses as well as developmental tasks to prepare for old age<sup>13</sup>. Stated that the presence of negative prejudices about old age tend to lower one's perceived health status<sup>14</sup>, and in this study, current health status is also a factor to consider in assessing depression in middle-aged women. In addition, self-efficacy has been reported to play an important role in sustaining behavioral change and change in middle-aged women<sup>15</sup>, and it could be considered as a major variable to predict the health status of middle-aged women.

Depression in middle-aged women associated with menopause and menopausal symptoms<sup>12,16,17</sup> has been a subject of continuous interest.

Therefore, according to these interests and various efforts, it is necessary to reevaluate the depression of middle-aged women and to investigate the relationship between depression and the main physical, social and psychological variables affecting depression.

For this, the study aims to investigate the effects of perceived condition of health, social support, menopausal symptoms, and self-efficacy on depression of middle-aged women. In addition, the study aims to improve the understanding of depression in middle-aged women, and to provide basic data for establishing

plans for depression prevention and intervention.

### **B. Purpose of the Study**

The purpose of this study was to investigate the effects of menopausal symptoms, perceived condition of health, social support, and self-efficacy on depression, and specific objectives are as follows.

First, identify the menopausal symptoms, perceived condition of health, social support, self-efficacy, and depression levels of the subjects.

Second, identify the correlation between menopausal symptoms, perceived health status, social support, self-efficacy, and depression of the subjects.

Third, identify the effects of menopausal symptoms, perceived health status, social support, and self-efficacy on depression in subjects.

## **II. RESEARCH METHOD**

### **A. Designing of the study**

This present study is descriptive research to figure out the factor that influence on depression of middle-aged women.

### **B. Participants**

200 middle-aged women who reside in C area and M area were picked as the subject of this study by using random sampling selection.

The required sample size was estimated by GPOWER 3.1.2 program. As a result of calculation of number of required samples for 5 predictors for multiple regression analysis is 5, .15 effect size, .05 significant level, .90 test power, number of sample was at least 116 people, but we did convenience sampling and used the data as the final analysis material.

### **C. Research Instruments**

#### **Symptom of Menopause**

Used menopausal symptom measuring tool was supplemented tool that MENSEI (Menopause Symptom Index) developed<sup>18,19</sup>.

The instrument consists of three sub-areas.

The questionnaires consisted of a total of 23 items, including 11 items of physical symptoms, 8 items of mental symptoms, and 4 items of sexual symptoms. In the study by<sup>19</sup>, Cronbach's alpha was .90, and for the present study was .89.

#### **Perceived condition of Health**

For perceived condition of health<sup>20</sup>, it consists of a total of 3 items and higher scores indicate higher perceived health status.

The Cronbach's alpha reliability of the original scale was .76. The reliability of the present study regarding the perceived condition of health was .88.

#### **Social Support**

Social Support was measured using Social Support Scale developed by<sup>21</sup>. It is a self-report scale of 10 questions including 5 family relation items and 5 friend relation items, and higher scores indicate higher social support. The sub domain reliability Cronbach's alpha in this study were family relationship .86 and friendship .91.

#### **Self-Efficacy**

Self-efficacy was measured using Self-efficacy Scale developed by<sup>22</sup>. This instrument consists of a total of 17 items, and higher scores indicate higher degree of self-efficacy. Cronbach's alpha was .71 at the time of development, and reliability was .85 in this study.

### Depression

Depression was measured using CES-D developed by<sup>23,24</sup>. It consists of 20 items and 16 points or more denote depression potential. The reliability Cronbach's alpha in the study was .89.

#### D. Date Collection

The data collection period of this study was from November 01, 2015 to November 30, 2015, and the subjects of data collection were middle-aged woman living in C area and M area. After the researcher explained the necessity and purpose and the method of the study and asked for their consent, written consent of the people who agreed to participate in the study were obtained and the data was collected. The questionnaire took about 15 minutes. The questionnaire was stored in a sealed envelope and collected by the researcher.

#### E. Data Analysis

The collected data were data analyzed using the SPSS/WIN 21.0 statistical program. Difference of depression degree in accordance with general characteristic of subject was analyzed with t-test and ANOVA. For relation with menopausal symptom, perceived health condition, social support, self-efficacy and depression of subject, Pearson's correlation coefficient was used, and we analyzed to figure out explanation power of factors that influence on depression by using Stepwise multiple regression analysis.

## III. RESULTS

### A. General Characteristics of the Participants

The general characteristics of the participants are shown in Table 1. Results show that the mean age of the subjects was 50.2, with 45.5% in the age group of 40 ~ 49, and 54.5% in the middle age group over 50. For marital status, 93.5% were married, and the most common type of family was with children at 80%. 50.5% had religious affiliation, and for education 67% were below high school graduates. For occupation, 81.1% were working, and for monthly income, it was in the order of 34.5% over 3 million KRW under 5 million KRW, 28.0% over 2 million KRW under 3 million KRW, 19.5% over 5 million KRW, and 18.0% under 2 million KRW. For menstrual state in middle aged women, the most frequent was regular at 52.0%, irregular 16.5%, and menopause 31.5%. 57.5% engaged in irregular exercise, 17% engaged in regular exercise, and 25.5% did not engage in exercise.

Table 1: General Characteristics of Subjects

(N=200)

Characteristics	Division	N(%)
Age	40-49 years	91(45.5)
	Over 50 years	109(54.5)
Marital status	Married	187(93.5)
	Unmarried	6(3.0)
	Other	7(3.5)
Living together type	Alone	6(3.0)
	Married couple	29(14.5)
	Children	160(80.0)
	Other	4(2.0)
Religion	Yes	99(49.5)
	No	101(50.5)
Education Level	Below High School	134(67.0)
	University Graduate	66(33.0)
Career	Yes	65(19.0)
	No	162(81.0)
Monthly income (thousand won)	Under 2,000	36(18.0)
	More than 2,000-Under 3,000	56(28.0)
	More than 3,000-Under 5,000	69(34.5)
	More than 5,000	39(19.5)
Menstruation Status	Regular	104(52.0)
	Irregular	33(16.5)
	Menopause	63(31.5)
Physical Exercise	Regular	34(17.0)
	Sometimes	115(57.5)
	Not at all	51(25.5)

**B. Menopausal Symptoms, Perceived Condition of Health, Social Support, Self-Efficacy, and Depression Levels of Participants**

The menopausal symptoms of the subjects were low at 0.66 (0-2), perceived health status score was moderate at 3.14 (1-5), and social support score was high 3.85 (1-5). Self-efficacy was moderate at 3.47 points (1-5) and depression was low at 0.53 points (0-3 points). See 'Table 2'

Table 2: Middle-Aged Women's Symptom of Menopause, Perceived Condition of Health, Social Support, Self-Efficacy and Depression

Variables	M±SD	Range
Symptom of Menopaus	0.66±0.35	0-2
Perceived condition of Health	3.14±0.71	1-5
Social Support	3.85±0.67	1-5
Self-efficacy	3.47±0.46	1-5
Depression	0.53±0.44	0-3

**C. Depression According to General Characteristics of the Participants**

Depression according to general characteristics of the participants is shown in Table 3. Depression in subjects showed statistically significant differences in family type (F=3.716, p=.012), occupation (t=3.197, p=.002), monthly income (F=3.727, p=.012), and menstrual state (F=4.820, p=.009).

Table 3: Difference of Depression According to the General Characteristics (N=200)

Characteristics	Division	M±SD	t or F(p)
Age	40-49 years	0.50±0.38	-.936(.350)
	Over 50 years	0.56±0.48	
Marital status	Married	0.53±0.42	.233(.792)
	Unmarried	0.61±0.79	
	Other	0.45±0.44	
Living together type	Alone	0.97±0.86	3.716(.012)
	Married couple	0.36±0.35	
	Children	0.55±0.42	
	Other	0.41±0.34	
Religion	Yes	0.97±0.86	-.300(.764)
	No	0.50±0.38	
Education Level	Below High School	0.56±0.48	-.070(.944)
	University Graduate	0.53±0.42	
Job	Yes	0.61±0.79	3.197(.002)
	No	0.45±0.44	
Monthly income (thousand won)	Under 2,000	0.65±0.53	3.727(.012)
	More than 2,000-Under 3,000	0.56±0.48	
	More than 3,000-Under 5,000	0.56±0.41	
	More than 5,000	0.34±0.25	
Menstruation Status	Regular	0.44±0.36	4.820(.009)
	Irregular	0.64±0.39	
	Menopause	0.63±0.55	
Physical Exercise	Regular	0.55±0.44	1.212(.300)
	Sometimes	0.49±0.42	
	Not at all	0.61±0.47	

**D. Relation with Menopausal Symptom, Perceived Condition of Health, Social Support, Self-Efficacy and Depression of Middle-Aged Women**

In relation between variables related to depression of middle-aged women, menopausal symptom ( $r=.485$ ,  $p<.001$ ) appeared correlation of significant quantity, social support ( $r=-.210$ ,  $p=.003$ ), self-efficacy ( $r=-.330$ ,  $p<.001$ ) appeared (-) correlation. See 'Table 4'.

Table 4: Relation with Menopausal Symptom, Perceived Health Condition, Social Support, Self-Efficacy and Depression of Middle-Aged Women

(N=200)

	menopausal symptom	perceived health condition	social support	self-efficacy	depression
menopausal symptom	1				
perceived health condition	-.383(<.001)**	1			
social support	-.301(<.004)**	.370(<.001)**	1		
self-efficacy	-.259(<.004)**	.144(.042)*	.268(<.001)**	1	
depression	.485(<.001)**	-.062(.385)	-.210(.003)**	-.330(<.001)**	1

\* $p<0.05$ , \*\* $p<0.01$

**E. The Factor that Influence on Depression of Middle-Aged Women**

The most predictive factor that influences on depression degree of subject is menopausal symptom, which is appeared to explain in order of 23.6% ( $\beta=.464$ ,  $P=001$ ) of explanation power about depression, 28.1% ( $\beta=-.228$ ,  $P=001$ ) when self-efficacy is added, 31.1% ( $\beta=-.203$ ,  $P=.001$ ) when monthly income is added, 34% ( $\beta=.217$ ,  $P=001$ ) when perceived health condition is added, and 36.4% ( $\beta=-.160$ ,  $P=008$ ) when an occupation is added. See 'Table 5'.

Table 5: The Influence Factor of Depression of Middle-Aged Women

(N=200)

Variables	B	SE	$\beta$	t	p	Adjusted R <sup>2</sup>	F	P	Durbin-Watson
Constant	1.040	.276		3.771	<.001		22.084	<.001	1.750
menopausal symptom	.578	.080	.464	7.239	<.001	.236			
Self-efficacy	-.218	.057	-.228	-3.800	<.001	.281			
monthly income	-.090	.026	-.203	-3.481	<.001	.311			
perceived health condition	.135	.040	.217	3.395	<.001	.340			
Occupation	-.179	.066	-.160	-2.695	.008	.364			

**IV. DISCUSSION**

The present student was conducted to identify the factors that correlate with depression in middle-aged women and to investigate the effects of general characteristics, menopausal symptoms, social support, and self-efficacy on depression.

As a result, the characteristics of the subjects that showed difference in depression were family type, occupation, monthly income, and menstrual state. Also in a previous study<sup>25</sup>, the general characteristics that show differences in depression in middle-aged women were education level, occupation, monthly income, health status, and satisfaction with spouse and children. In addition, there were differences in depression according to economic conditions<sup>12</sup>, and there was also a significant difference in menopause and depression<sup>26,27</sup>, showing similar results to this study. It was stated that in middle-aged women, higher stress in such things as family, economy, health, and role lead to higher depression<sup>9</sup>, and through this study, the characteristics that can explain depression in middle-aged woman could be reconfirmed.

Factors correlated to depression in middle-aged women included menopausal symptoms, social support, and self-efficacy, and menopausal symptoms was the most predictive factor affecting depression in the subjects. The fact that menopausal symptoms are associated with depression has already been confirmed by many previous studies<sup>12,16,17</sup>. The menopausal symptoms experienced by many middle-aged women may lead to the experience of depression not only due to physical discomfort but also due to the individual's psychosocial situation and life event stress. It is stated that scores of depression was lower with more

positive attitude towards menopause<sup>16</sup>. Menopausal symptoms are associated with health-related quality of life<sup>28</sup>, and the perceived health status of the subject is related to health management<sup>29</sup>. In addition, considering that the main sources of information related to menopause in middle-aged women are family, friends and neighbors<sup>30</sup>, there needs to be social psychological and family approach and support considering their characteristics, correct knowledge of menopause and menopausal symptoms in middle-aged women through education, and establishment of a plan for healthy coping of depression and menopausal through acceptance of it as a process of human development.

In this study, social support and self-efficacy were inversely correlated with depression in middle-aged women. Thus, higher social support and self-efficacy led to lower degrees of depression. These results suggest that positive psychological factors and interpersonal variables such as self-efficacy and social support in middle-aged women have preventive functions in lowering depression. Many previous studies<sup>9,25,31,32</sup> also show that social support is an important factor in reducing depression. Social support is a belief that they are respected and loved in social relations and it can be explained by emotional or material advice and tips, information sharing, hobbies and leisure sharing from friends, neighbors, and social organizations including family members<sup>33</sup>. Thus, because social support can be achieved through the family, the workplace, and the community, it requires support such as various linkage programs that include middle-aged women and their families. People with high self-efficacy also experience aging, and because they have the confidence to appropriately cope with the changes they face<sup>34</sup>, it is thought that they will healthily cope with middle age, where they experience physical and psychological change due to things like menopause and menopausal, and various life event stress<sup>13</sup>.

Based on the results of this study, to enhance social support and self-efficacy which are factors affecting depression in middle-aged women, there needs to be development and application of programs for middle-aged women at work and in the community that improve positive emotions such as self-efficacy and provide practical assistance such as social support. It is a meaningful result that social and policy support is required to enable middle-aged generations to move on to a healthy senescence at the present time of Korean society entering an aging society. Because depression in middle-aged women is closely related to menopausal symptoms, self-efficacy, and social support, it is determined that there needs to be development of programs that can improve self-efficacy in middle-aged women through social participation activities and positive emotions, as well as continuous interest and nursing.

## V. CONCLUSION

The purpose of this study was to investigate the effects of perceived condition of health, social support, menopausal symptoms, and self-efficacy on depression of middle-aged women, to improve the understanding of depression in middle-aged women, and to provide basic data for establishing plans for depression prevention and intervention. As a result of the study, the characteristics of the subjects that showed difference in depression were family type, occupation, monthly income, and menstrual state. Factors correlated to depression in middle-aged women included menopausal symptoms, social support, and self-efficacy, and menopausal symptoms was the most predictive factor affecting depression in subjects. Therefore, there needs to be development and application of programs for middle-aged women that improve self-efficacy and provide practical assistance such as social support. The study suggests as follows based on the results and discussion. First, it is suggested to consider characteristics and levels of depression in middle-aged women during development of programs. Second, a comparative study on the influence on depression of middle-aged men is suggested.

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## Effects of the Lecture on the Spinal Health for College Students

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### Abstract---

**Background/Objectives:** This study was attempted to check if there would be any changes in students' knowledge about spinal diseases after medical specialists delivered a lecture on health to students.

**Methods/Statistical Analysis:** Data were collected from 175 college students who participated in the lecture on health. The students took part after seeing the notice on the bulletin board posted with prior approval by the school in October 2015. This study measured their responses to questions concerning knowledge and the level of their overall knowledge about spinal diseases by a self-administered method, using structured questionnaires before and after the lecture on health.

**Findings:** The study showed knowledge about spinal diseases significantly increased after the lecture on health ( $t=-3.29$ ,  $p= .001$ ). As a result, the lecture mainly delivered substantial information and the correct knowledge about spinal diseases, and it turned out that the degree of their overall knowledge about spinal diseases increased after the lecture on health. In addition, it was found that the rate of correct answers to questions about spinal diseases increased after the lecture on health.

**Improvements/Applications:** The results of this study can be utilized as basic data that contribute to reducing the national healthcare expenditure by increasing the understanding of knowledge about the spine.

**Keywords---** Spinal Health Education, Health Knowledge, Health Promotion, College Students, Cost Effectiveness.

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## I. INTRODUCTION

The spine consists of neck bones (12 cervical vertebrae), backbones (5 thoracic vertebrae), hucklebones (5 lumbar vertebrae) and tailbone (1 coccyx). A person with a spinal disease may experience a backache, a radiating pain and a numbing symptom in the lower limbs due to disorder or damage to vertebrae or nerves and tissues<sup>1</sup>. As for the causes, anaplastia makes up 50-70% of the spine diseases; traumas or tumors, 10-20%; and unknown causes, about 10%<sup>2</sup>. According to the data of the Ministry of Health & Welfare in 2015, in South Korea, there are about 12.6 million patients diagnosed with a spinal disease in 2014, and one out of four Korean people experienced symptoms of the spine diseases<sup>3</sup>. The count of claims for spinal diseases increased by 41.3 million cases (about 1.889 trillion won) from about 46.6 cases in 2007 (about 1.986 trillion won) to about 87.9 million cases in 2014 (about 3.876 trillion won), which is an increase of 88.4% in cases and 95.2% in medical expenses<sup>3</sup>. Students' use of computers and cell phones for long hours, which may cause lack of exercise and lack of understanding of diseases, along with bad postures, increase spinal diseases<sup>4</sup>.

According to the 2014 health insurance statistics, most hospitalized patients had disc disorders (275,000 people) while most outpatients had back pains (6.44 million people). As for the days of diagnosis and medical expenses per person, most hospitalized patients had 'osteoporosis accompanied by a pathological fracture' (25.8 days, 2.82 million won) while most outpatients had 'spondylosis (M46-M49)' (64 days, 175,000 won) and other disc disorders (63 days, 174,000 won)<sup>5</sup>. As a result of checking records for hospitalization and surgery for spinal diseases in 2014, the number of hospitalization was 1.3 million cases and the number of spine surgery was 155,000 cases, and about 12% of hospitalized patients had spinal surgery. In addition, as compared to that in 2007, the number of cases of hospitalization for spinal diseases increased by 124.9% while the number of spine surgeries increased by 31.6%<sup>5</sup>. The amount excludes uninsured expenses, and if the uninsured expenses are added, the expenses will greatly increase. Spinal diseases cause various uninsured expenses, and recently, moral hazard due to manual therapy has increased. Since uninsured expenses are not uniform in hospitals, the prices for manual therapy ranged from 10,000 won to 250,000 won for one session<sup>6</sup>. Public insurance, the national health insurance, recognizes it as uninsured expenses, and private insurance, covers the actual damage, so it has been noted that there is serious medical abuse<sup>7</sup>.

Recently, the frequency of spinal diseases has increased in proportion to the aging population, and it is predicted that, in the future, spinal diseases will continue to increase according to population aging. However, the cases of the spine surgery accounted for 3.5%, and the share of medical expenses was 4.2% in the people in their 10-20s, and in particular, of the people diagnosed with scoliosis in 2015, those in their 10-20s accounted for 60.6%, which shows that adolescents in the period of growth have weak spinal muscle and wrong postures<sup>3</sup>. During this period, since 10-20s' lifestyle has been relatively less settled than adults' lifestyle, there is a possibility to correct their lifestyle<sup>8</sup>. After carrying out health education with college students, they come to be interested in their health and take responsibility for their health<sup>9</sup>. Thus, it is judged that it is possible for those with spinal diseases to correct their postures sufficiently through proper education.

Therefore, if college students' understanding about spinal diseases is increased through a lecture on health of the spine, it will be possible for them to maintain healthy lifestyles and develop proper habits of medical use. Thus, this study would provide basic data to help reduce the national health expenditure.

This study aims to assess the degree of college students' knowledge about the spine before and after carrying out a lecture on spinal health and to check the educational effects of the lecture on health.

The specific purposes of this study are summarized as follows:

First, to check the degree of college students' spine-related knowledge;

Second, to check four categories of college students' spine-related knowledge (The structure of the spine, pains of the spine, spinal diseases and proper/correct position of the spine); and

Third, to verify the effectiveness of the lecture on the spinal health for college students.

## II. MATERIALS AND METHODS

This study is a one group pretest-posttest design, aiming to verify the effects of a lecture on health, carried out in order to examine college students' knowledge about spinal diseases.

**A. Research Subjects**

Research subjects were 175 students at one college located in the Incheon area of South Korea, who voluntarily participated in a lecture on health and agreed on the application form to participate in a lecture on health carried out in October 2015 as one of the lectures on health for college students as a social contribution project by the Korea Medical Aid Foundation in 2015. The number of samples was 111 people, when significance level was .05; effect scale, .03 (intermediate); and the power of the test, .95 in a t-test of G\*Power<sup>10</sup> and it was judged that the number of subjects in this study was appropriate. For the survey tool, a method of checking changes after the lecture on health was used with nine questions to check the basic knowledge about the spine. As for the survey tool, from multi-disciplinary experts, including two medical specialists (preventive medicine and orthopedics), one professor of health science and one doctor of nursing science, content validity was verified, concerning the nine questions to check knowledge about spinal diseases and the degree of the overall knowledge about spinal diseases. Regarding the reliability of the tools in this study, Cronbach's alpha = .68.

**B. Ethical Considerations for the Participants**

This study was conducted with students at a college located in the Incheon area by a third party (research assistant) to secure the participants' anonymity, obtaining approval from the legal team of the Korea Medical Aid Foundation. The participants were given an explanation about matters concerning the research purpose and research method, and they were given an explanation about the guarantee of anonymity and private situations. The survey was conducted after explaining that they could stop completing the survey anytime if they would like. With the collected data, a third party, the research assistant gave a serial number to the participants before and after the survey, so that the researcher would not know the identities of the participants.

**C. Data Analysis**

For a statistical analysis of the collected data, SPSS/WIN 23.0 was used. As for the statistical analysis methods, demographic characteristics were used, and for the level of knowledge about each spinal disease, a frequency analysis was used.

For the effectiveness of the lecture, 2 points were given for the correct answer to the questions about knowledge before and after the lecture and 1 point for a wrong answer, and in order to compare the average, it was analyzed with a paired t-test. The statistically significant level was based on .05.

**III. RESULTS AND DISCUSSION**

For the socio demographic characteristics of the research subjects, there were 42 male students (24.0%) and 133 female students (76.0%). For age, 171 people were between 20 and 25 (97.7%), and four people were over 26 (2.3%) as seen in [Table 1].

Table 1: Sociodemographic Characteristics of the Participants

(N=175)	
Characteristics	n (%)
Sex	
Male	42 (24.0)
Female	171 (97.7)
Age (years old)	
20-25	171 (97.7),
26>	4 (2.3)
Total	175 (100.0)

The overall knowledge about the spine was scored one to three with self-administered method, and as a result of checking the scores: 1 point for "I don't know it well," 2 points for "Neither" and 3 points for "I know it well," the number of the respondents who responded, "I don't know it well (1 point)" decreased from 31 (17.7%) to 13 (7.4%) while the number of those who responded, "I know it well (3 points)" increased by almost three times from eight (4.6%) to 24 (13.7%) as seen in [Table 2].

Table 2: Knowledge Level of Spinal Health

(N=175)

Score	Before education n (%)	After education n (%)
1.00	31 (17.7)	13 (7.4)
2.00	136 (77.7)	138 (78.9)
3.00	8 (4.6)	24 (13.7)

The nine questions about knowledge about the spine consisted of two questions for the structure of the spine, two for the pains of the spine, three for spinal diseases, and two for the right position of the spine. Of them, to seven questions, they chose the correct answers more after the lecture; however, to two questions, one about the pains of the spine and one about the right position of the spine, they rather chose wrong answers after the lecture. To Question No. 7 about spinal diseases, 35 more people chose the correct answer after the lecture (133 people, 76.0%), whereas only 94 people chose correctly before (53.7%), so the rate of correct answer increased by 22.3%. To Question No. 3 about the pains of the spine, 157 people (89.7%) chose wrong answers before the lecture, and 142 people (81.1%) after the lecture, so 15 more people (8.6%) chose the wrong answers as seen in Table 3. As additional items, 167 (95.4%) out of the 175 participants responded that the lecture was helpful while eight people (4.6%) responded that it was not. Of those who responded that it was not helpful, four people (2.3%) responded that the topic was not interesting; two people (1.1%) responded that there was a lack of lecture contents; and two people (1.1%) responded that the lecture was not smooth. The lecture most of them wanted for the next time was one about mental diseases like depression, 54 people (30.9%), followed by female disorders, 26 people (14.9%), pain management, 18 people (10.3%) and cervical cancer, 18 people (10.3%), which were the third place. The fifth place was male disease, 18 people (10.3%), followed by gastric cancer, 15 people (8.6%), thyroid cancer, nine people (5.1%), spinal diseases, six people (3.4%) and geriatric illness, six people (3.4%). Other opinions included muscular disease, knee diseases and sex education as seen in [Table 3].

Table 3: The Correct Answers to the Questions about Spine Health

(N=175)

Classification	Answer	Before education n (%)	After education n (%)
Structure of the spine	Yes	151 (86.3)	152 (86.9)
	no	24 (13.7)	23 (13.1)
Structure of the spine	Yes	151 (86.3)	162 (92.6)
	no	24 (13.7)	13 (7.4)
Pains of the spine	Yes	157 (89.7)	142 (81.1)
	no	18 (10.3)	33 (18.9)
Pains of the spine	Yes	144 (82.3)	147 (84.0)
	no	31 (17.7)	28 (16.0)
Spinal diseases	Yes	148 (84.6)	153 (87.4)
	no	27 (15.4)	22 (12.6)
Spinal diseases	Yes	83 (47.4)	102 (58.3)
	No	92 (52.6)	73 (41.7)
Spinal diseases	Yes	94 (53.7)	133 (76.0)
	No	81 (46.3)	42 (24.0)
Right position of the spine	Yes	170 (97.1)	172 (98.3)
	No	5 (2.9)	3 (1.7)
Right position of the spine	Yes	98 (56.0)	91 (52.0)
	No	77 (44.0)	84 (48.0)

As seen in [Table 4] shows that the knowledge about spinal diseases significantly increased from  $17.7 \pm 1.45$  points before the lecture to  $18.2 \pm 1.46$  points after that ( $t = -3.29, p = .001$ ).

Table 4: Effects of the Spinal Education

Variable	(N=175)			
	Before education Mean±SD	After education Mean±SD	t	p
Correct answer	17.7±1.45	18.2±1.46	-3.294	p<0.001

As the causes of the chronic diseases increase and the age at which spinal diseases occur gets lower, an interest in health increases. In addition, since there is high popularity of lectures on health in mass media and college, the medical specialists in lecture on health are in the limelight as star lecturers. Most preceding studies examined the difference in changes in health behaviors after a lecture on health. Health education for the promotion of college students' health increased the subjects' health promotion behaviors<sup>11</sup>. Park, Jeong-sook noted that health education increased health promotion behaviors<sup>12</sup>. This study showed the same result that the lecture on health had effects. The effectiveness was same as the result of the application of Program for Improving Drinking Culture (PIDC), which found statistically significant educational effects on the amount of alcohol consumption, drinking habit and AUDIT-K after the education ( $p<0.001$ ), which supported this study<sup>13</sup>. As a result of this study, the respondents preferred lectures on health on female disorders and cervical cancer, and it is judged that the number of female participants was more than that of male participants, so they were interested in the diseases associated with women. As Gallant argued that sex should be considered in the intervention plan for changing the elderly's health behaviors<sup>14</sup> and that sex must be considered since it is an important factor of college students' health promotion behaviors<sup>9</sup>. It was found through this study that sex is an important factor of studies of lecture on health. Therefore, it is expected that acquiring the correct knowledge, caring for and maintaining healthy lifestyles themselves can help contribute to their appropriate medical use.

However, this study was conducted with one healthcare-related college, so it is difficult to generalize the result. In addition, the assessment of the degree of knowledge, too, was limited to partial knowledge about spinal diseases, so this study has a limitation that it cannot be extended to the result of the degree of knowledge about the general diseases.

#### IV. CONCLUSION

This study was conducted to confirm the effects of a lecture on health delivered to college students in South Korea. As a result, the lecture mainly delivered substantial information and the correct knowledge about spinal diseases, and it turned out that the degree of their overall knowledge about spinal diseases increased after the lecture on health. In addition, it was found that the rate of correct answers to questions about spinal diseases increased after the lecture on health. With the above findings of the study, the following suggestions would be made.

First, since the delivery of the correct knowledge about health can have an effect just through a lecture on health in a short time, it is suggested that a program that can induce the correct changes in health behaviors through a continuous lecture on health for college students should be operated.

Second, since this study was conducted with students in a healthcare-related college, it is judged that the degree of their knowledge about health is higher than that of students with different majors, so it would be necessary to conduct a study with college students with other majors in the future.

Third, it is necessary to develop a customized education program for considering the difference in the degree of knowledge between students in health science-related colleges and students with other majors and to prepare an assessment tool to evaluate this.

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## The Effects of Thera-Band Resistance Exercise on Headache and Physical Movement Among Young Adults Using Smartphone

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### Abstract---

**Background/Objectives:** The purpose of this study was to investigate the effect of stabilization exercises for university students' neck and shoulder are as who are using smart phones, to measure HIT-6, NDI, CRA, PPT, and their pain areas.

**Methods/Statistical Analysis:** The 64 participants were divided into an experimental and a control group based on CVA=52°. Stretching, relaxation and stabilization exercises were applied to the experimental group. Stretching and relaxation exercises were applied to the control group. The exercise programs were implemented for 50minutes 3times a week for 3weeks.HIT-6, NDI, CRA, PPT and pain areas were used as the measurement tools. At test was performed to compare the experimental group to the control group.

**Findings:** Occipital muscles and the upper trapezius emerged as the most frequently reported pain areas. HIT-6 and NDI significantly decreased in the experimental and control groups. However results showed the experimental group was more effective. The experimental group showed only a significant difference on CRA. Exercise for the experimental group was more effective than for the control group for PPT.

**Improvements/Applications:** Thera-band resistance exercise programs applied in this study are effective to relieve headache and improve posture for smart phone users.

**Keywords---** Smart-Phone, Forward Head Posture, Exercise, NDI, HIT-6, CRA.

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## I. INTRODUCTION

Globally, the number of people using smart phones is increasing dramatically, especially in members of younger generations. The longer time spent on smart phones, the greater the risk of having physical conditions. The usage of smart phones causes inappropriate posture such as a forward head posture (FHP)<sup>1</sup>. FHP, called "reading neck," indicates that the cervical spine is positioned anterior. This posture reduces overall curves of the cervical spine, leading to significant increases in stress in the posterior neck<sup>2,3</sup>. Furthermore, structural deformation of other connected areas around the head can occur as consequences of compensative abnormal muscle contractions<sup>4</sup>. This muscular skeletal disorder in the neck area also relates to tension headaches. A previous study of 30 university students by Hwang and Kwan<sup>5</sup> using X-rays to measure craniovertebral angle revealed an association between smart phone dependency and musculoskeletal pain.

Posture is an essential component in balance and muscular activation requires good body posture alignment<sup>6</sup>. Good alignment in the neck and shoulder area, in particular, allows timely reactions to the external environment with a greater range of motion<sup>3,7</sup>. Postural stability is critical in movement, which involves the whole musculoskeletal system<sup>8</sup>. Aiming to achieve coordination and arrangement of interdependent muscles in a body trunk, shoulder stabilization exercise places shoulder bones between the 2nd and 7th ribs, the core of trunk<sup>9,10</sup>.

A variety of therapies were designed to manage symptoms of FHP including ultrasound, therapeutic exercise, and electrotherapy. Exercise therapy has high potential to improve not only muscle strength and muscle mass but also physical capacity in people with FHP. Combining stretching exercise with isometric, static, dynamic stretching exercise, endurance training, and proprioception exercise, therapeutic exercise can effectively improve functional performance of people with a musculoskeletal disorder<sup>11</sup>. Thera-band resistance training, as a shoulder stabilization exercise, comprises ten specifically tailored activities targeting the neck and shoulder muscles<sup>12</sup>. This exercise has high potential to correct bad body alignment; thus it is most frequently recommended for people with FHP. Thera-band is an inexpensive and safe device and thera-band resistance training is one of the most frequently used treatments to reverse tendon stiffness caused by shoulder and neck disorders. Resistance training using thera-band allows users to perform a large range of motion with either a greater or lesser intensity of effort<sup>12</sup>.

Much of previous research focused on treatment for smart phone addiction or effectiveness of smart phone applications. However, only a few studies evaluated the effects of smart phone usage, physical posture, and headache in younger people. Thus, the present study examined the effectiveness of a shoulder and neck resistance exercise program using thera-band on physical posture and headache.

## II. MATERIALS AND METHODS

### A. Subjects and Duration

Participants in this study were recruited from one university located in C city, Korea. Younger people in their 20s who were experiencing unknown headaches with neck or shoulder discomfort were invited. All invited participants were informed about the thera-band resistance exercise program and agreed to participate in the study. Based on previous studies<sup>13,14</sup>, 63 participants were required using G-power analysis and 64 participants were recruited in consideration of dropouts. This study was approved by the Institutional Review Board of National University in Korea (No. KNUT IRB-25).

### B. Apparatus

A survey was conducted to obtain smart phone-related information using self-reporting questionnaires that previous studies<sup>14-17</sup> referenced. The Headache Impact Test-6 (HIT-6) was used to evaluate the impact of headache on daily life. Using a self-report questionnaire, higher scores indicated more severe headache with a maximum score of 78. The level of neck disability was assessed using NDI<sup>18</sup>. NDI consists of ten items to measure pain and functional disability in the neck, with higher scores indicating severe neck disability. The craniovertebral angle (CVA) and cranial rotation angle (CRA) were measured to diagnose and evaluate the severity of FHP<sup>19-21</sup>. PPT represents the least pressure that generates pain<sup>22,23</sup>. A pressure algo meter (Medi tech group) was used to measure PPT.

### C. Intervention

The thera-band resistance exercise program was designed to stabilize muscles in the neck and shoulder.

This 50-minute program was conducted three times a week for three weeks. Detailed components of the program are shown in Table 1. The control group performed 50 minutes of a simple muscle-relaxation exercise three times a week for three weeks as shown in Table 2.

Table 1: Stretch and Relaxation Exercise for Neck, Shoulder and Upper Body Muscle

Weeks	Position	Contents	Duration
1 week	Sitting	Both SCM, Scalene, Suboccipitals, Levator Scapulae, Trapezius, Pectoralis Major, Deltoid, Rhomboid	50minute/day, 3time/week, 3weeks
2~3 week	Standing		

Table 2: Stability Exercise Program for Neck and Shoulder

Weeks	Position	Contents	Duration
1week	Sitting	Pelvic neutral setting exercise, Neck retraction, Self-isometric exercise(Neck flexion-extension, right-left bending), Hold-relax exercise.	50min/day, 3time/wk 3wks
2week	Standing	Neck retraction exercise, Self-isometric exercise(Neck flexion-extension, right-left bending), Hold-relax exercise(Trapezius, Rhomboid), Pushing the wall(Serratus anterior)	
3week	Standing (Thera-Band)	Respiration exercise, Pelvic neutral setting exercise, Neck retraction exercise, Y-raise exercise, Shoulder exercise(abduction-adduction, scapular protraction), W-raise exercise.	

#### D. Statistical Analysis

Data were analyzed using the SPSS (version 18.0). The normality of data was evaluated using Kolmogorov–Smirnov and Shapiro–Wilk tests. Paired ttests were used to examine the differences between pretest and posttest outcomes. Independent ttests were used to evaluate the difference in changed score between the experimental and control group. The significance level was set at  $p < .05$ .

### III. RESULTS AND DISCUSSION

Demographic characteristics of study participants are shown in Table 3. Participants reported pain most frequently in the occipitalis and upper trapezius as shown in Table 4. After receiving the 3-week intervention, the experimental group experienced improvement in HIT-6, NDI, CRA, and PPT as shown in Table 5 and Table 6. Statistically significant differences between the experimental and control groups only on the HIT-6, NDI, and CRA. No statistical significance was found in changed scores between groups for PPT.

This study was conducted to evaluate the effectiveness of 3-weeks of a thera-band resistance exercise for young adults using smart phones. Study findings indicated that the occipitalis is the area where young adults using smartphones report pain most frequently. This is in line with a previous study<sup>24</sup> which showed that people using a visual display terminal (VDT) maintained muscle activity in the cervical erector spine and upper trapezius 5% above the maximum electromyogram. The imbalance of muscle in the upper trunk, including head, neck, and shoulder, result in FHP, which leads to flexion in the lower cervical spine and extension in the upper cervical spine<sup>25</sup>. With technological development, young people use increasing numbers of features and spend longer periods on smart phones. Increasing hours of smart phone use results in greater damage to physical health<sup>26</sup>; thus, timely and early interventions can prevent this impairment.

In this study, the thera-band resistance exercise showed effectiveness in alleviating headache; the group comparison revealed better effects in HIT-6 for the experimental group. In addition, results on the NDI revealed that the thera-band resistance exercise reduced the level of discomfort in the neck and shoulders. Lee<sup>27</sup> intervened with cranial rhythmic impulses and McKenzie's exercise for people experiencing headache also found significantly improved cervical muscle tone. A previous study<sup>28</sup> also found statistically significant improvement after performing flexor muscle-strengthening exercises and neck-muscle strengthening. Inappropriate posture increases muscle tension in the neck; thus, people with headache can experience relaxation resulting in alleviation of pain, thereby reducing strain in the neck muscles.

According to Fernandez-de-Las-Penaset al<sup>29</sup>, the smaller the CVA, the higher level of pain in the neck and head when using smartphones for a longer duration. Measuring angles in the range of cranial rotation, this study found improved neck movement after the 3-week thera-band resistance exercise. Similar outcomes were found in previous studies conducting exercise interventions to improve neck movement. In an intervention study using sling exercises, CVA of the experimental group significantly improved<sup>30</sup>. Other studies conducting stretching exercises and muscle-strengthening exercises also reported statistically

significant improvement in neck movement in the exercise group<sup>31</sup>. Although various exercises proved effective, some exercises such as sling exercises required a particular space and apparatus, which may present a barrier. Considering easy accessibility and usability, the thera-band exercise should be highly recommended by health professionals.

Interestingly, a statistically significant difference emerged between the experimental and control groups when examining homogeneity between groups using baseline data. In this study, participants with CVA greater than 52° were allocated to the control group. This can be explained by an association between neck pain and CVA<sup>32,33</sup>. Thus, considering the decrease in CVA, relatively increased CRA could be measured when members of the control group stared forward<sup>31</sup>. The thera band resistance exercise is effective for decreasing CRA. In the group comparison, the exercise decreased CRA more on the experimental group. This is similar to the result of the previous study that shows a significant decrease in CRA after applying stretching exercise and strengthening program<sup>33</sup>.

PPT is the point at which pressure turns to pain, here used as an indicator for tension headaches caused by lesions in muscles around the head. In measuring PPT in various body parts-occipitalis, upper trapezius, levator scapulae, supraspinatus, rhomboid, SCM, pectoralis minor, and serratus anterior—PPT increased in all participants in the experimental group whereas members of the control group did not show statistically significant change in the serratus anterior. In addition, group difference was found in two places: the upper trapezius and the rhomboid. Other intervention studies showed a similar outcome in that a myofascial release technique and FHP correction exercise increased PPT<sup>34</sup>. Muscle training by exercise reduces the sensitivity of pressure in neck muscles resulting in decreased neck pain. The present study did not find a change in PPT at the same level as previous studies. Knowing that longer term training has greater effects, long-term study may provide clearer evidence of the thera-band exercise to improve PPT.

Table 3: General Characteristics of the Subjects (n=64)

		Experimental group		Control group		t	p
		(n)	(%)	(n)	(%)		
Sex	Male	17	51.5	19	61.3	.621	.461
	Female	16	48.5	12	38.7		
		Mean±SD		Mean±SD			
Age		21.72±1.35		21.77±1.70		-.122	.903

Table 4: Locations of Regional Pain when Using Smart Phone

Rank Pain Area	Experimental group						Control group						χ <sup>2</sup>			p		
	(n)			%			(n)			%			1	2	3	1	2	3
Occipitalis	15	6	5	45.5	18.2	15.2	15	4	3	48.4	12.9	9.7	4.08	3.68	4.28	.54	.72	.64
Upper Trapezius	15	13	2	45.5	39.4	6.1	13	15	2	41.9	48.4	6.5						
Levator scapulae	1	5	7	3.0	15.2	21.2	0	5	10	0	16.1	32.3						
Supraspinatus	1	2	8	3.0	6.1	24.2	0	3	10	0	9.7	32.3						
Rhomboid	0	6	6	0	18.2	18.2	2	2	5	6.5	6.5	16.1						
SCM	1	1	3	3.0	3.0	9.1	1	1	1	3.2	3.2	3.2						
Pectoralis minor	0	0	0	0	0	0	0	1	0	0	3.2	0						
Serratus Anterior	0	0	2	0	0	6.1	0	0	0	0	0	0						

Table 5: The Comparison between Experimental Group and Control Group. HIT-6, NDI, CRA

		Experimental group(n=33)		Control group(n=31)		t	p
		Mean±SD		Mean±SD			
HIT-6	Pre	46.09±10.11		47.84±7.43		-.784	.436
	Post	43.03±7.48		47.23±6.92			
	Post-Pre	-3.06±4.15		-0.61±1.36			
	t	-4.24		-2.51			
	p	.000*		.018			
NDI	Pre	8.64±3.98		5.45±3.27		.348	.001*
	Post	6.82±2.74		4.68±2.55			
	Post-Pre	-1.81±1.89		-0.77±1.12			
	t	-5.51		-3.86			
	p	.000*		.001*			
CRA	Pre	149.19±6.43		142.05±5.94		4.61	.000*
	Post	145.53±6.05		140.85±5.98			
	Post-Pre	-3.67±4.48		-1.21±4.06			
	t	-4.71		-1.65			
	p	.000*		.109			

\*: p<0.05

Table 6: The Comparison between Experimental Group and Control Group.PPT(lb)

		Experimental group(n=33)	Control group(n=31)	<i>t</i>	<i>p</i>
		Mean±SD	Mean±SD		
Upper Trapezius	Pre	3.29±1.49	3.60±1.69	-.767	.446
	Post	4.18±1.22	3.98±1.61		
	Post-Pre	0.89±0.87	0.38±0.50	2.85	.006*
	<i>t</i>	5.85	4.28		
	<i>p</i>	.000*	.000*		
Rhomboid	Pre	4.07±1.48	4.01±0.87	.197	.845
	Post	4.86±1.52	4.43±0.96		
	Post-Pre	0.78±0.77	0.41±0.47	2.30	.024*
	<i>t</i>	5.84	4.85		
	<i>p</i>	.000*	.000*		
Pectoralis minor	Pre	2.80±1.03	2.91±1.02	-.404	.687
	Post	3.42±0.83	3.32±1.02		
	Post-Pre	0.61±0.69	0.41±0.66	1.132	.262
	<i>t</i>	5.05	3.51		
	<i>p</i>	.000*	.001*		
Serratus Anterior	Pre	2.66±1.09	2.54±0.87	.490	.626
	Post	3.37±1.19	3.83±4.93		
	Post-Pre	0.71±0.86	1.29±4.78	-.686	.495
	<i>t</i>	4.75	1.50		
	<i>p</i>	.000*	.143		
SCM	Pre	1.90±0.89	1.99±0.63	-.449	.655
	Post	2.27±0.81	2.29±0.61		
	Post-Pre	0.36±0.38	0.29±0.42	.696	.489
	<i>t</i>	5.41	3.88		
	<i>p</i>	.000*	.001*		

\* \*:  $p < 0.05$ 

#### IV. CONCLUSION

Long-term use of smartphones induces imbalance and inappropriate posture caused by imbalanced muscles and physical stress. Furthermore, bad body alignment leads to unnatural strain on the body, resulting in headache. Findings from this study revealed the effects of the thera-band shoulder-stabilization exercise in all outcomes of physical movement accompanied by headache. Conducting regular exercise, body alignment, and balanced posture can assure stability of muscle interactions. Although this study could not provide clear evidence for positive effects of the thera-band exercise, longer term and more intensive intervention may produce better outcomes in future research.

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## Influencing of Nutritional Label use, awareness of Nutrition Label, Nutrition Knowledge on Eating Behavior in Nursing Students

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### Abstract---

**Background/Objectives:** The purpose of this study was to identify the use and awareness of nutritional label, a nutritional knowledge and eating behaviors, and factors effects on eating behaviors among nursing students.

**Methods/Statistical Analysis:** The subjects consisted of 195 nursing students in the G city in Korea. The data were collected by structured questionnaires. The variables of nutritional label use, awareness of nutrition label, nutrition knowledge, and eating behavior. Data analysis was performed using the IBM SPSS Statistics version 20.0., using t-test, ANOVA, Pearson correlation Coefficient and multiple linear regression analysis.

**Findings:** The mean score for nutritional label use was 3.41 out of 5, awareness of nutrition label was 3.50 out of 5, and nutrition knowledge was 13.15 out of 20. The eating behavior was 31.03 out of 50. Eating behavior was significantly correlated with awareness of nutritional label ( $r=.156, p=.030$ ). Factors influencing eating behavior were exercise ( $\beta=.217, p=.002$ ), dining out ( $\beta=.203, p=.004$ ), skipping meals ( $\beta=.165, p=.018$ ), awareness of nutrition label ( $\beta=.136, p=.048$ ), explained power was 12.9%. These factors should be considered that develop the nutritional education program for nursing students. This study is meaningful conducted in nursing students who will be cared patients. Majority of the subjects were breakfast skipping meals, and showed that needed nutritional knowledge regarding therapeutic diet regimens. It should be emphasized on teaching nursing students in curriculum.

**Improvements/Applications:** These findings indicated that it is necessary to educate nutritional care and to develop nutritional nursing program for health promotion.

**Keywords:** Eating Behavior, Use of Nutritional label, Awareness of Nutrition Label, Nutrition Knowledge, Nursing Student.

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## I. INTRODUCTION

In national disease prevention and health management, the importance of nutrition and dietary consumption has been stood out these days with the need of health promotion measures that are more preventative and cost-effective and enhance the quality of lives<sup>1</sup>. It has been reported that one out of two adults over 30 years suffers from obesity, high blood pressure, dyslipidemia or diabetes that are believed to be mainly caused by dietary habits and also their fat intakes have been on the continuous increase<sup>2</sup>. Therefore, healthy dietary habits that are based on corrective nutritional knowledge are necessary. It is important for consumers to utilize nutritional label and have the ability to properly understand the contents of nutritional label so that they can make effective selections of suitable food for their health conditions and dietary needs, and be more effective in preventing chronic diseases. Therefore, awareness on nutritional label is required for a healthy dietary life. The consumers' nutritional knowledge and awareness on nutritional label is very important tool for the increased dietary patterns for healthy meals and, based on right dietary knowledge, persistent and continuous practice for the increase is required<sup>3</sup>. University students, those entering into adulthood from adolescence, participate more and more in various activities other than doing schoolwork and experience big changes in their dietary life due to skipping meals, irregular dietary life, more opportunities for dining out and drinking. Dietary habits shown during university periods may be factors predicting future diseases in their adulthood and therefore desirable eating behaviors are necessary<sup>4</sup>. Especially nursing students are in a good position to analyze nutritional problems and provide accurate and practical information and educate patients when they work as student apprentices during their university periods and professional nurses after the graduation<sup>5</sup>. With the growing importance of nutritional care for patients, many hospitals adopt multi and interdisciplinary team approach (NST: nutritional support team) for a systematic nutritional support and nurses work as part of that system, and improved quality of nursing service can have a significant effect on patient's recover<sup>6</sup>. Therefore, nursing students needs to have a good nutritional knowledge. However, it is pointed out that nurses do not have adequate knowledge on nutrition although nursing students are given education on nutrition<sup>7</sup>. The previous studies on university students was carried out on the eating behaviors related to weight change<sup>8</sup>, use of nutritional label and eating behaviors<sup>9</sup>. So far no study was made on the eating behaviors, use of and awareness on nutritional label and nutritional knowledge of nursing university students.

Thus, in this study, we will try to identify the use and perception of nutrition label, a nutritional knowledge and eating behaviors, and to determine differences in eating behaviors based on general characteristics, variables correlated to eating behavior, factors that have effects on eating behaviors among nursing students. Thereby, it will be provide to basic data for the education of nutritional nursing and its practice.

## II. METHOD

### A. Subjects

Data were collected from a university using the convenience sampling method from January 12 to January 20, 2016. The subjects were 195 undergraduate nursing students. The subjects agreed to participate in this study after they were informed about the purpose of study, freedom to stop engagement, the guarantee of anonymity with study, and so on.

### B. Instruments

Three instruments were used in this study. Nutritional label use and awareness of nutrition label was assessed the level of nutritional label use, awareness of nutrition label using by Lee & Kim<sup>10</sup>. This is 5-point likert scale, the higher the score is the higher of label use and perception. Nutrition knowledge was measured the instrument of nutrition knowledge using by Yoon & Choi<sup>11</sup>. This instrument has 20 items, consist of general nutritional knowledge and diet therapy on disease and the higher score means the higher nutrition knowledge. Eating behavior was assessed using mini dietary assessment index<sup>12</sup>. This scale consists of 10 items and a 5-point Likert scale. The higher score means desirable eating behavior.

### C. Statistical Analysis

The data were analyzed using t-test, ANOVA, Pearson correlation Coefficient and multiple linear regression analysis with IBM SPSS Statistics version 20.0. General characteristics, nutritional label use, awareness of nutrition label, nutrition knowledge, mini dietary assessment index were analyzed using

frequency, percentage, average, standard deviation. Differences on eating behavior by general characteristics were analyzed t-test, ANOVA. Correlations between eating behavior and nutritional label use, awareness of nutrition label, nutrition knowledge were analyzed using Pearson correlation. Factors influencing eating behaviour were analyzed using multiple linear regression analysis.

### III. RESULTS

#### A. General Characteristics

70.5% of the total sample were women and 29.7% were men; 22.1% (n=43) were freshmen, 27.2% (n=54) were sophomore, 25.6% (n=50) were junior, 24.6% (n=48) were senior. 98% of the subjects in this study had without a meal, 85.5% among these were breakfast skipping meals [Table 1].

Table 1: General Characteristics of the Subjects (N=195)

Variables	Categories	n(%)
Sex	Male	58(29.7)
	Female	137(70.3)
Grade	Freshman	43(22.1)
	Sophomore	54(27.2)
	Junior	50(25.6)
	Senior	48(24.6)
Without a meal	Yes	192(98.0)
	No	3(2.0)
Skipping meals (n=192)	Breakfast	164(85.4)
	Lunch	8(4.2)
	Dinner	20(10.4)
Dining out	Yes	80(41.0)
	No	115(59.0)
Smoking	Yes	17(8.7)
	No	178(91.3)
Drinking	Yes	130(67.0)
	No	65(33.0)
Exercise	Yes	129(66.2)
	No	66(33.8)

#### B. Nutritional label use, Awareness of Nutrition Label, Nutrition Knowledge, and Eating Behavior

The mean score for nutritional label use was 3.41 out of 5, awareness of nutrition label was 3.50 out of 5, and eating behavior was 31.03 out of 50. Nutrition knowledge was 13.15 out of 20. And percentage of corrective answer on nutrition knowledge was 65.7% [Table 2]. Due to the study subjects being nursing students, they were needed more nutritional knowledge on diet to care effectively those who have disease.

Table 2: Nutritional Label Use, Awareness of Nutrition Label, Nutrition Knowledge, and Eating Behavior of the Subjects

(N=195)			
Variables	M±SD (%)	Categories	n(%)
Nutrition label use	3.41±1.18		
Awareness of nutrition label	3.50±0.82		
Nutrition knowledge	13.15±3.21	Corrective answer	(65.7)
Eating behavior	31.03±6.05		

#### C. Correlations between Eating Behavior and Nutritional Label Use, Awareness of Nutritional Label, Nutrition Knowledge

Table 3 Shows that eating behavior was significantly correlated with awareness of nutritional label (r=.156, p=.030).

Table 3: Correlations between Eating behavior and Nutritional label use, Awareness of nutritional label, Nutrition knowledge(N=195)

Variables	Eating behavior r(p)
Nutritional label use	.124(.083)
Awareness of nutrition label	.156(.030)
Nutrition knowledge	.020(.779)

#### D. Factors influencing Eating behavior

Factors influencing eating behavior were exercise ( $\beta=.217$ ,  $p=.002$ ), dining out (no) ( $\beta=.203$ ,  $p=.004$ ), skipping meals (dinner) ( $\beta=.165$ ,  $p=.018$ ), awareness of nutritional label ( $\beta=.136$ ,  $p=.048$ ), the regression model explained 12.9% of eating behavior [Table 4].

Table 4: Factors Influencing Eating Behavior(N=195)

Predictors	B	SE	$\beta$	t	p
Intercept	23.88	1.988	.350	12.01	<.001
Exercise	2.725	0.860	.217	3.170	.002
Dining-out (No)	2.466	0.835	.203	2.953	.004
Skipping meals (dinner)	3.225	1.353	.165	2.384	.018
Awareness of nutrition label	1.007	0.505	.136	1.993	.048
F=8.07 (P<.001) Adj.R <sup>2</sup> =.129					

\* Reference groups 0=Exercise No, Dining out Yes, Skipping meals (Breakfast)

## IV. DISCUSSION

In this study, 192 respondents (98%) said "yes" to 'Skipping Meals' and 184 respondents (85.4%) skipped breakfast. The reports of University students in China having regular meals relatively with 79% of them having three meals a day, and nursing students in Greece, 69% of them, not skipping breakfast<sup>13</sup> raise the needs for the nutrition and health promotion program incorporated into nursing education programs for nursing students in Korea. For the mean score of nutritional label use, the study showed 3.41, roughly a median level. The study conducted on students in US<sup>9</sup> showed 3.3 mean score, similar to the result of this study and reported the use of nutritional label helping to choose for healthier diet, which raises the needs for the use of nutritional label.

The mean score of awareness of nutritional label showed 3.5, roughly a median level. The studies on female adults in Iran showing the result of less than 50% on nutritional awareness<sup>14</sup> and on adults in Korea showing lower level of metabolic syndrome cases with higher level of awareness on nutritional label<sup>2</sup> raise the needs for a continuous emphasis on awareness on nutritional label.

On nutritional knowledge, the average score was 13.15 with the rate of answering correctly, 65.7%. This suggested that more nutritional knowledge on a restricted diet is required to nursing students, subjects for this study, who will care for people with diseases later. The study on nutritional behavior showed the mean score of 31.03, which is roughly a median level.

In this study, the eating behavior and the awareness of nutritional label showed statistically significant positive correlation ( $r=0.169$ ,  $p=.01$ ). Therefore, active education and promotion to students on nutritional label and healthy eat in behavior are required. There was no correlation found between eating behaviors and nutritional knowledge, which reminded of the importance of actual practicing over having the knowledge.

It was found that the factors affecting eating behavior are physical exercise, dining-outs, skipping meals, awareness of nutritional label. It is thought that doing physical exercise reflected high level of interest in health<sup>15</sup> and the study subjects behaved in a desirable eating behavior for their health.

The result of this study showed dining outs had an effect on eating behavior and dining outs leads to health problems due to the excessive intake of calories and the nutritional imbalance<sup>16</sup>, therefore should be recommend reduce dining out. The result of this study also showed that skipping meals was a factor affecting eating behavior and many study subjects had their breakfasts skipped mentioning the reasons such as 'not

having enough time' or 'not wanting to bother to'. It was shown that the recognition that having breakfast was important affected eating behavior of university students. Thus, suitable scheme needs to be taken to reduce frequency of dining outs and skipping meals. The study on university students in<sup>9</sup> said that awareness on nutritional label mediated healthy dietary behavior partly, which supported the result of this study.

## V. CONCLUSION

The results of this study showed that wide spread and education of nutritional label is needed, nursing care of nutrition should be emphasized on teaching nursing students in curriculum. Also, actual food habit rather than knowledge about nutrition is more influenced on eating behavior. Factors influencing eating behavior were 'doing exercise', 'no dining-out', 'no skipping meals (breakfast)', higher level of perception of nutritional label. With this result, it should be considered as develop the nutritional education program. We suggest that future studies should be identifying factors associated with eating behavior, including other variables.

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## Factors Related to Oral Health-Related Quality of Life

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### Abstract---

**Background/Objectives:** The purpose of this study is to examine the general characteristics of local adults and the impact of objective and subjective oral health status on oral health-related quality of life.

**Methods/Statistical Analysis:** A survey has been conducted with patients at the scaling center of the dental hospital. Including research paper of oral health written by the dental hygienist. A total of 305 questionnaires have been analyzed except for the questionnaires with insincere answers. The collected data have been analyzed by R project program. Based on them, frequency, cross, the mean and standard deviation, T-test and multiple linear regression analysis have been conducted.

**Findings:** The average level of oral health related quality of life was 3.75 out of 5, the average level of simplified oral hygiene index was 2.30 out of 5. Also, the average number of natural teeth was 26.73 except for third molars, the average number of missing teeth was 2.48, and the average number of implants was 2.52. Diagnosis(gingivitis, periodontitis), the number of missing teeth and the number of natural teeth make significant differences in oral health related quality of life( $p < 0.05$ ). As result of the study, it was shown that oral health related quality of life was decreased by more chewing difficulty and more pronunciation difficulty. Whereas it was increased by more natural teeth and less scaling fear. In conclusion, it has been confirmed that negative subjective awareness of dental health status and critical oral symptom had a negative effect on oral health related quality of life. Moreover, the result is that subjective oral symptom has been a major influential factor in oral health related quality of life.

**Improvements/Applications:** Future research should further investigate the factors related to the quality of life. In order to promote oral health, it will be necessary to develop diverse oral health education for oral health education.

**Keywords---** Dental Hygiene, Oral Health Impact Profile, Oral Health Status, Periodontal Disease, Quality of Life.

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## I. INTRODUCTION

The meaning of health is being expanded from the concept of consultation without disease to the broader health concept<sup>1</sup>. Oral health is an essential element of health in digestion and nutrition, and health without oral health is not a complete health<sup>2</sup>. Dental disease is easy to be neglected because it does not involve pain or discomfort at the early stage of development, and the main diseases are dental caries and periodontal diseases<sup>3</sup>.

Periodontal disease was reported to be the main cause of tooth loss in all teeth except upper and lower third molars teeth in adults. In particular, 86% of adults aged 35-44 suffer periodontal disease, and 7 out of 10 adults have periodontal disease<sup>4,5</sup>. Despite the fact that more than 64.5% of the population feel discomfort in daily life due to periodontal disease, because the initial treatment is insufficient, periodontal disease worsens and the teeth are shaken or lost in most cases<sup>5</sup>. Loss of teeth can narrow the range of food choices and reduce the amount and quality of meals, making it difficult to maintain health and fitness. In addition, tooth loss affects pronunciation and appearance, thereby limiting social relations and interpersonal relationships, thereby promoting social isolation. The inconvenience of losing teeth is directly related to the quality of life by taking away happiness that comes from eating<sup>6,7</sup>.

Therefore, this study aims to investigate the effects of the characteristics of the research members and their oral health status on oral health-related quality of life. Based on these results, this study aims to provide the data necessary for education and policy establishment for prevention of oral diseases, and to be the basis of research data to find ways to for oral health related quality of life to contribute to improvement of human life quality.

## II. MATERIALS AND METHODS

### A. Subject of Study

This study was carried out on 323 adult patients aged 20 years or older who came to the dental clinic in the D area for medical treatment. The questionnaire survey was conducted by those who understood the purpose of the study and agreed to participate in the study. The final analysis was 305 out of the questionnaires, 18 of which were unsatisfactory or inadequate.

### B. Method of Study

A structured self-filling questionnaire survey paper was developed and used after observing tools used in previous researches. The questionnaire consisted of 29 questions including 5 general questions, 4 subjective oral health status questions, 6 oral condition questions for dental hygienists and 14 questions of oral health-related quality of life. The collected questionnaires were analyzed using the R project program. Frequency analysis, crossover analysis and chi-square test were conducted on the variables of the study subjects. In order to investigate the impacts on oral health related quality of life of study subjects, multiple linear regression analysis was conducted.

### C. Research Variable

In this study, general characteristics were gender, age, education level, monthly income, and occupation. If subjective oral health status questions were answered as very healthy, healthy, and normal, they were categorized as "good". If the answers were very bad and bad, they were categorized as "bad". For questions about how much do you care oral health, answers such as "do not care at all", "care a little", and "normal" were classified as "not interested" and answers such as "care a lot", and "care very much" were classified as "interested".

Oral status variables were diagnosis names, systemic diseases, implant, missing teeth, natural teeth, and oral hygiene index. The diagnoses were classified into gingivitis and periodontitis after confirmation of pre-treatment screening. Systemic diseases were indicated as "present" if there were more than one systemic disease. The number of implants was classified as "having" if there were more than one implant. The number of missing teeth was classified as "present" if there were more than one missing tooth in the mouth except the upper and lower third molars. Based on 28 teeth except for upper and lower third molar, missing teeth, and implants, the natural teeth variables were classified as "defective" if there were more than one defect and "retention" if there was no defect. For the oral hygiene index variable, the oral hygiene index was measured as "good" from 0 to 1.2, "normal" from 1.3 to 3.0, and "bad" from 3.1 to 6.0. The following table summarizes the

research variables.

### III. RESULTS

#### A. Oral Health Related Quality of Life According to General Characteristics

The quality of life related to oral health according to age was 3.74 points for below 40 and 3.76 points for over 40. Statistically, there were no significant differences. The level of education was 3.77 points below high school, which was higher than university score of 3.75, but it was not statistically significant. The monthly average income was 3.81 for more than 2 million won ~ 4 million won and showed the highest score on life quality related to oral health. However, there was no statistically significant difference. Professionals, technical workers, and office workers showed the highest score on oral health related quality of life among other occupations but it was not statistically notable (Table 1).

Table 1: Oral Health Related Quality of Life According to General Characteristics

Division		Oral health-related quality of life		p-value*
Age	Under 40	3.74	±0.74	0.811
	Over 40	3.76	±0.69	
Education level	High school graduate or lower	3.77	±0.73	0.829
	college graduate or higher	3.75	±0.71	
Monthly income	Less than 2 million won	3.65	±0.71	0.226
	From 2 million won to 4 million won	3.81	±0.69	
	more than 4 million won	3.78	±0.76	
Occupation	Specialized, Technical, Office, Administrative	3.79	±0.71	0.286
	Service, Sales, Self-employed Business, Business	3.63	±0.60	
	Student, Housewife, Unemployed, Etc	3.78	±0.78	
Total		3.75	±0.71	
*p<0.05				

#### B. Oral Health Related Quality of Life According to Subjective Oral Health Status

People with good subjective oral health status scored 3.90 showing they enjoy higher level of oral health related quality of life than those with bad subjective oral health status who scored 3.55. This showed statistically significant difference (p<0.001).

People with eating problems by oral disorders scored 3.16 while people with no such discomfort scored 4.07 showing statistically significant difference (p<0.001). Subjects with pronouncing problems by oral disorders scored 2.98 while people with no such disorders scored 3.85 meaning people without oral disorders enjoy higher level of oral health related quality of life. This also showed statistically notable difference (p<0.001) (Table 2).

Table 2: Oral Health Related Quality of Life According to Subjective Oral Health Status

Division		Oral health related Quality of life		p-value*
Subjective oral health status				
	Good	3.90	±0.68	<0.001*
	Bad	3.55	±0.71	
Oral health care level				
	Interested	3.74	±0.73	0.613
	Not interested	3.79	±0.67	
Masticating problems by oral discomfort				
	Not discomfort	4.07	±0.60	<0.001*
	Discomfort	3.16	±0.51	
Pronouncing problems by oral disorders				
	Not discomfort	3.85	±0.68	<0.001*
	Discomfort	2.98	±0.53	
Total		3.75	±0.71	
p<0.05*				

### C. Oral Health Related Quality of Life According to Oral Status

According to the diagnosis, gingivitis scored 3.79 points and periodontitis scored 3.55 points, which was statistically significant ( $p = 0.034$ ) regarding oral health related quality of life. There was a statistically significant difference ( $p = 0.025$ ) in the quality of life related to oral health among patients who had missing teeth and scored 3.60 while other patients without missing teeth scored 3.81 points. People maintaining natural teeth scored 3.83 while people with loss of natural teeth scored 3.64 meaning people with natural teeth enjoy higher level of oral health related quality of life. This showed statistically significant difference ( $p=0.024$ )(Table 3).

Table 3: Oral Health Related Quality of Life According to Oral Status

Division		Oral health-related quality of life		p-value*
Diagnosis	Gingivitis	3.79	$\pm 0.69$	0.034*
	Periodontitis	3.55	$\pm 0.79$	
Systemic disease	Peresence	3.80	$\pm 0.73$	0.669
	None	3.75	$\pm 0.71$	
Implant	Peresence	3.66	$\pm 0.79$	0.224
	None	3.78	$\pm 0.69$	
Missing teeth	Missing	3.60	$\pm 0.69$	0.025*
	Remaining	3.81	$\pm 0.72$	
Natural teeth	Remaining	3.83	$\pm 0.70$	0.024*
	Missing	3.64	$\pm 0.73$	
Simplified-Oral hygiene index	Good	3.91	$\pm 0.75$	0.142
	Usually	3.71	$\pm 0.69$	
	Defective	3.71	$\pm 0.72$	
Total		3.75	$\pm 0.71$	
$p^* < 0.05$				

### D. Variables of Oral health-related Quality of Life

The results of multiple linear regression are shown in Table 4 to identify variables affecting quality of life related to oral health. Variables of oral health related quality of life were eating discomfort from oral disorders ( $p < 0.001$ ), pronouncing problems by oral disorders ( $p < 0.001$ ), and number of natural teeth ( $p < 0.001$ ). Its effectiveness was 54.5%. People with eating discomfort from oral disorders ( $\beta=0.066$ ) showed lower oral health related quality of life than who do not suffer any kind of them. People with pronouncing discomfort from oral disorders ( $\beta=0.097$ ) also showed lower quality of life related to oral health. Greater number of natural teeth ( $\beta=0.015$ ) showed higher level of oral health related quality of life (Table 4).

Table 4: Variables of Oral Health-Related Quality of Life

Characteristics(reference)	Division	B	$\beta$	p-value*
Subjective oral health status(Good)	Bad	-0.119	0.062	0.058
Eating discomfort from oral disorders (comfortable)	Uncomfortable	-0.720	0.066	<0.001*
Pronouncing problem from oral disorders (comfortable)	Uncomfortable	-0.438	0.097	<0.001*
Name of diagnosis (gingivitis)	Periodontitis	0.031	0.086	0.717
Oral hygiene index <sup>1</sup>		-0.029	0.025	0.239
Number of natural teeth		0.056	0.015	<0.001*
Number of missing teeth		-0.084	0.083	0.317
$R^2 = 0.545$ , Adjust $R^2 = 0.530$ , $F = 37.473$				
B : non-standardized coefficient, $\beta$ : standardized coefficient				
<sup>1</sup> Higher oral hygiene index means negative oral health status.				
* Multiple Linear Regression was used ( $p^* < 0.001$ ).				

#### IV. CONCLUSION

In the modern society, health has become one of the most important concerns. In particular, oral health is closely related to pronunciation and aesthetic appreciation as well as nutrition in order to maintain a healthy interpersonal relationship and social life<sup>8</sup>. Therefore, oral health is very important for general improvement of quality of life. While the quality of life is variously being studied throughout the medical field, it is meaningful to examine the variables affecting the quality of life related to oral health in a multifaceted way. This study sought to compare the oral status and scaling fear of some local adults with subjective oral health-related quality of life<sup>9</sup>.

The purpose of this study was to analyze the relationship between these variables and to contribute to the future improvement of oral health related quality of life. The research of characteristics of oral health-related quality of life resulted as follows: female for gender, older for age, lower level of education, better subjective oral health status, and capable of eating and pronouncing comfortably showed better quality of life<sup>10-13</sup>. This results were similar to the results by Kim MJ and Kim JH<sup>14</sup>. Additionally, periodontitis lowered quality of life while less systemic disease, less implant and loss of teeth, more natural teeth, and lower oral hygiene index showed better quality of life<sup>15-17</sup>.

The limitations of this study are as follows: First, the validity of the survey can be pointed out due to limitations of the self-filling questionnaire survey. However, by using some measure of reliability, there will be no problem in identifying the influencing variables. Secondly, because this study is a cross-sectional study, it is not possible to know the choices of independent variables and the true causal relationship between the parameters and dependent variables. However, this study is expected to be a reference to other studies in the future since this study corresponds to previous studies. In order to overcome these limitations, longitudinal studies should be conducted. Third, there are limitations in generalizing the results of research because the subjects were limited to certain areas.

Results of this study indicate that negative subjective oral health status and worse symptoms of oral disorders negatively affect oral health related quality of life. Subjective oral health status was analyzed to be a variable which greatly affects quality of life related to oral health. Future researches should further investigate the variables of oral health related quality of life in a multifaceted way. In order to promote oral health, it will be necessary to develop various oral health education materials and to expand oral hygiene businesses for oral health education.

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## Work-Family Conflict, Family-Work Conflict and Job Satisfaction in a Sample of Married Teachers

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### Abstract---

Work-Family Conflict is a classification of inter-role conflict where the amount of time given to, and tension created by the job hinders acting on family-related duties while Family-Work Conflict is a classification of inter-role conflict where the amount of time given to and tension created by the family hinders acting on work-related duties. Job Satisfaction, alludes to reactions and feelings people have for their job. This study specifically investigated whether work-family conflict, family-work conflict, and job satisfaction are interconnected paradigms. To achieve the purpose of the study, a total of 199 basic education teachers, all of which were married, were asked to respond to the Work-Family Conflict, Family-Work Conflict, and Job Satisfaction Scales. Statistical Analyses revealed that Work-Family Conflict is positively and considerably connected with Family-Work Conflict and negatively and considerably connected with Job Satisfaction while Family-Work Conflict is negatively and significantly connected with Job Satisfaction. The researcher explored the possible inferences of these findings to the sample used in the study.

**Keywords---** Job Satisfaction, Married Teachers, Family-Work Conflict, Work-Family Conflict.

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## I. INTRODUCTION

The teaching profession requires so much effort from teachers. This is because of the multiple hats teachers need to wear – advisor, counselor, mentor, and second parent to name a few. Aside from the demands of teaching profession, teachers also need to attend to personal and familial concerns; thus, one common difficulty experienced by teachers is the balancing between the demands of their personal lives and the demands of their works.

Clark (2000) believes that the family-work systems, though considered different, are inter-connected. Individuals, on a daily basis, take part in multiple and two different dimensions – the work dimension and family dimension. These individuals shape these dimensions, models the bounds, and determine the relationships. With the changes to the workplace and the profile of employees, conducting studies that will focus on the relationship between family and work inclined into be more significant.

Principally, work-life balance is assumed to be an extensively studied occurrence in most studies with the past few span of years, various ways have been identified to determine how work and private life affect each other. This is because the achievement of work-life balance is regarded as a new approach to human resource management policy (Maern, Pitarelli & Cagiano, 2013). In relation, Kegatharan (2015) believe that collaboration between experts, specialists, and members of organization is needed to identify best mechanisms aimed at balancing family and work in the contemporary world.

### A. *Work-Family Conflict*

Work-Family Conflict is a classification of inter-role conflict where the amount of time given to, and tension created by the job hinders acting on family-related duties (Netemeyer, Boles, &McMurrian, 1996). Latest researches done that has in the past few decades concerning Work-Family conflict has progressed and has steered to the advancement of intellectual and academic models, observational studies, and organization-backed work-family initiatives . The growing body of research about work-family is results of organizations' attempt to aid employees manage the balance work and family loads. (Ahmad, 2008).

For example, the Center for Advanced Human Resource Studies in 2010 found that men also experiences struggles from this conflict, sometimes on a greater effect, in contrast to the general insight that women are affected by work-family conflict. While most who are inclined to believe that people are equal and deserve equal rights and opportunities, those who believe that men and women can balance and share work and family roles, tend to experience more responsibility when work hinders time with the family. Specifically, Frone, Russel, and Cooper (1997), found in their study, that employees do not entertain more working hours because this reduces the time available to fulfill their family roles. It is believed that stress and fatigue caused by strain in one role are prospected to serve as hindrance to perform the other role.

The possible impact of work-life conflict is believed to be detrimental. As found in the study conducted by Grant-Vallone and Donaldson (2001), work-family conflict projects employee well-being. It was also revealed that work-family conflict was a long-term predictor of employee's sensitive well-being. Since data were collected in two relative points of time, it is assumed that the internal validity of the study was improved. And even the long-term effects were considered small, work-family conflict were still believed to have abrupt and longer term effects on the overall well-being of employees. In the same light, Frone, Russel and Cooper (1997) found out that individuals with higher level of alcohol consumption are more likely to experience work-family conflict.

Also, in a study conducted by Cousin and Tang (2004) that specifically focused on the time spent at work and the prevalence of work and family conflict in the Netherlands, Sweden, and the United Kingdom. It was revealed that the occurrence of balancing work and family life in the said countries yield some unanticipated and contrasting results. In the case of Sweden where equality and work-family policies are imposed, high numbers of mothers and fathers than the other countries have reported a conflict between work and family lives. On the other hand, the case in the Netherlands and the United Kingdom has more men than women report tension between work and family responsibilities. It can be ascribed to the number of hours of work between men and women, but in the perspective of different roles, standpoint, and solutions to the underlying tensions on both work and family life.

Focusing on teachers, Nart and Batur (2014) conducted a study on work-family conflict, job stress, and organizational obligation. Findings from the study revealed that work-family conflict contribute to job stress

and partial negative effect on organizational obligation. Job stress causes a negative effect on organizational obligations, while Maeran, Pitarelli, and Cangiano (2013) found in their study that teachers perceived a sensible negative effect of work over family (work-family conflict). This was manifested with the average value of this variable as only being marginally significant. It was therefore noted that a considerable extent of the positive influence between work and family, and the perception that one's commitment in various areas do have positive implication in other facets of life.

### ***B. Family-Work Conflict***

If work creates conflict with family affairs, it can also be assumed that family affairs create conflict with work. To be specific, Family-Work Conflict is a classification of inter-role conflict where the amount of time given to and tension created by the family hinders acting on work-related duties. (Netemeyer, Boles, & McMurrian, 1996).

The center for Advanced Human Resource Studies (2010) specifically found that men who have customary sex perspective tend to experience guilt when family responsibility creates tension with work, compared to woman, and compared to more egalitarian men. Additionally, people with traditional sex role views, for example, those who consider men should be the one accountable for work responsibilities and women for family responsibilities, tend to experience more guilt when family creates tension with their work—regardless of sex. What is striking in the research is that employees feel more guilty when family hinders work responsibility, but feels less guilt when work responsibilities hinders family responsibilities. This can be attributed to the increase in the acceptance of work to spill-over into private lives.

In the same light, the study conducted by Choi in 2009 specifically among Chinese employees found that work and family responsibilities contributes to life stress and that family concerns have stronger effect in life stress compared to work concerns. However, the researcher stressed that the conclusions should not be generalized because other possible factors prompting the work-family context includes political, economic, cultural factors- which is varied, to name a few. While the study conducted by Frone, Russel and Cooper (1997), it was revealed family-work conflict may attribute and is related to health problems such as high level of depression, poor physical health, and some incidents like hypertension.

### ***C. Job Satisfaction***

With the idea that most people would spend a quarter of their lives working (Blanch flower & Oswald, 1999), job satisfaction is an interesting topic for those who work for organizations and who study them is job satisfaction (Spector, 1997). It must be noted however that positive and negative aspects of a job influence satisfaction (Romle & Shamsudin, 2006)

Considering that job satisfaction is a variable that is attitudinal in nature (Spector, 1997). People who are conciliated with their jobs are more apt to creativeness, flexibility, innovativeness, as well as loyalty. (Wicker, 2011).

The best way to understand job satisfaction is by either focusing on employees or organizations. In the perspective of Humanitarian, they believe that people are worthy of respect as well as fairness. From another perspective, Utilitarian believes that contentment with the job can result to employee behaviors that can eventually affect the functioning of an organization, therefore job satisfaction might be considered a representation of organizational functioning (Spector, 1997).

Focusing on employees, job satisfaction manifests emotional well-being or intellectual health (Spector, 1997). This gives an emotional state that provides pleasure and can lead to positive work attitude and better performance (Wicker, 2011).

It is important to be conscious of the people's welfare in the workplace (Blanch flower & Oswald, 1999). A good frame of mind arrays from employees who are contented with their job while those who are unappeased show the opposite.

And because job satisfaction is about how people feel about their works (Spector, 1997), people's mindset and attitudes do have an effect in their actions and performances, and in turn can affect the way they handle projects and responses to certain situations (Wicker, 2011). Job satisfaction reflects how happy one is with his/her job and can be improved by changing one's attitude or environment (MacDonald & MacIntyre, 1997). Analyzing job satisfaction is important because it is a measure of individual well-being (Clark, 1996).

#### ***D. Work-Family Conflict, Family-Work Conflict, and Job Satisfaction among Teachers***

Ahmad (2008b) specifically dealt on the direct and indirect effect of work-family conflict to job performance in a research article. Role Theory and Conservation of Resources Theory, and extant literature served as a model. The model proposed the following: 1) work and family conflict may or may not affect the job performance; 2) employee's emotional exhaustion that results to lower level of job performance increases work and family conflict; 3) work and family conflict decreases satisfaction with job which results to decreased job performance; 4) work and family conflict leads to emotional weariness that will reduce job satisfaction ergo the job performance. The model provides emphasis on the integration of work and family roles that could turn results in a struggle that creates unfavorable results.

Regarding studies conducted highlighting work-family, family-work conflict, and job satisfaction, Erdamar & Demirel (2014) conducted a study that focused on work-family conflict and family-work conflict of teachers from Ankara, Turkey. Researchers found that the most common work and family conflicts were continuing troubles at home that were first encountered at work, work-related physical and mental fatigues that cause difficulties in the attendance to home responsibilities, problems encountered at work that causes tensions and stresses at home. On the other hand, most common family-work conflicts were responsibilities and small works at home that causes one to sacrifice sleep, unexpected situations (a child becoming ill, unplanned guest) at home that affects work. Female and young teachers in their study experienced work-family conflict with greater intensity and private school teachers experienced both conflicts with greater intensity.

On the other hand, Maeran, Pitarelli, and Cangiano (2013) found in their study teachers only apprehend bearable negative influence of work over family (work-family conflict). It can be noted from the results of their study that the positive influence among work and family, and the perception that an individual's engagement in various areas had favorable significance on other life spheres. Most of the teachers reported their satisfaction with their jobs: adjectives such as interesting, useful, satisfying, exciting, good, creative, active, and pleasant, gained a general agreement higher than 84%. Moreover, a vast part of their sample considered their job exciting and would hardly change it with another one. The study was administered among teachers in the province of Vicenza in Italy.

Similarly, Erdamar&Demirel (2016) conducted a study to figure out the satisfaction in job and life and work-family and family-work conflict levels of teachers. Based on the results, job satisfaction average of teachers was good while life satisfaction average was moderate and life satisfaction grows as job satisfaction increases. Additionally, it was found out that teachers suffer more from work-family conflict than job satisfaction and family-work conflict. An unfavorable and significant correspondence was established between job satisfaction and work-family conflicts as well as family-work conflict. Using regression analysis, it was identified that life satisfaction and work-family conflict were the best predictors of job satisfaction.

In 2012, Bell, Rajendran, and Theiler conducted a study that focused on the possible relationship among job stress, well-being, work-life balance and work-life conflict specifically among Australian academicians. It was found in the study that discerned job stress, which include threat and pressure-type stressors, was associated with poorer work-life balance, and increased conflict among work and personal lives. Perceived job threat-type stress was further identified to be a significant predictor of work-life balance and conflict scores.

Also, perceived job threat-type stress was identified as a significant predictor of poorer well-being and increased ill-being. However, it is worth-noting that perceived job pressure-type stress was not identified as related with well-being or ill-being.

In the end, Bell, Rajendran, and Theiler (2012) still claimed that only few studies have been conducted with reference to teachers' ability to balance work and personal life then eventually overwhelm the work-life conflict.

This is despite the fact that more than ever, stresses in the academe are increasing. Additionally, Kengatharan (2015) asserted that even in a bashful world, it is still important to keep in mind that not all people in a collectivist society will be collectivists and vice-versa. And basing from exiting literature, there is an unforeseen gap in work-family conflict research in exploring work-family conflict especially in the Asian context which is very much different from those of the west. Thus, the need to conduct a study among work-family conflict, family-work conflict and job satisfaction specifically among Filipino basic education teachers is a timely undertaking.

## **II. THEORETICAL FRAMEWORK**

Wilensky's (1960) Spillover Theory believes that affect is segmented in an assortment of the domains which may include family life, leisure life, community life, and work life. The Spillover theory affirms the conditions under which the spillover among the work micro system and the family micro system may be favorable or not. Based from the research, it has been documented that spillover in terms of time, energy, and behavior is generally negative if work-family interactions are enduringly structured in time and space. Similarly, research also supports the approach that work flexibility, that enables individuals to integrate and overlap work and family responsibilities in time and space, leads to positive spillover and instrumental in achieving desirable work and family balance. (Hill, Fellis, & Matinson, 2003).

Rice, Near & Hunt (1980) through the review of extant empirical research found support for the Spillover Theory. According to the researchers, data indicate that people who are contented with work also tend to be contented with other specific domains of life and with life in general. In the contrary, people who are not contented with work become dissatisfied with other domains of life and with life as a whole. Furthermore, the researchers identified that support for the Spillover hypothesis provided by research that relates to job and life satisfaction is consistent with empirical research that test the relationship between other manifestations of work and non-work. Some features of work like occupation, task demands, or social interaction opportunities are related to some features of non-work like leisure activities, distribution of household duties, or social interaction.

Similarly, Grzywacz and Marks (2000) claimed that work-family conflict was associated closely to a number of family-related factors. It was identified that work and family factors that facilitated development like that of decision scope and family support were associated with less negative and more positive spillover among work and family. Conversely, work and family obstruction like job pressure and family argument were associated with more negative spillover and less positive spillover among work and family.

## **III. METHOD**

### **A. Research Design**

The study made use of a descriptive-correlational research design. Banyard and Grayson (2001) defined correlational research as a type of study that is constructed to measure and describe the relationship between two variables without an attempt to elaborate the cause of the relationship. In the present study, work-family conflict, family-work conflict and job satisfaction are the investigated variables. Means together with standard deviations were used to distinguish the nature of the data collected from the respondents. Pearson's Product Moment Correlation Coefficient was calculated to find out the relationship among the different variables of the study.

### **B. Respondents**

A total of 199 basic education teachers served as respondents of the study. All of the respondents were married and came from the provinces of Tarlac, Pampanga, and Bulacan in the Philippines. They were 89 males and 110 females.

### **C. Research instruments**

Three instruments were used in the study, namely the Work-Family Conflict Scale (WFCS), Family-Work Conflict Scale (FWCS) both developed and introduced by Netemeyer and McMurrian in 1996 and the Genetic Job Satisfaction Scale (GJSS) developed by MacDonald and Macintyre in 1997.

WFCS is a 5-item scale. The scale assesses work-family conflict with the use of a Likert scale of 1 to 7 (from Strongly Disagree to Strongly Agree). Higher scores indicate degrees of work-family conflict. Current reliability of the scale using the responses of married basic education teachers in this study is .89.

FWCS is also a 5-item scale. It assesses family-work conflict using a Likert Scale with the range of responses from 1 to 7 (from Strongly Disagree to Strongly Agree). Higher scores signify significant degrees of family-work conflict. The current reliability of the scale using the responses of married basic education teachers in this study is .89.

Conversely, the items in GJSS focus on employees' sentiments and reactions towards their jobs and their corresponding aspects. Structural characteristics of the job (i.e. actual value of wages, autonomy, status, etc.)

were not seen and considered to be as important in identifying employee job satisfaction. The scale is relevant to practically any occupation. Model of job satisfaction presented put emphasis on the reaction to events rather than the events per se. It has 10 items which are responded through the use of a Likert scale with the range of responses from 1 to 5 (from Strongly Disagree to Strongly Agree). Current reliability of the scale using the responses of married basic education teachers in this study is .81.

#### IV. RESULTS AND DISCUSSIONS

Table 1 presents the set of information related to the profile of the first research instrument administered to the respondents. It shows the means and the standard deviations for all the responses garnered from the total of 199 married basic education teachers on the WFCS while Table 2 shows the descriptive statistics for WFCS for the total sample population (N=199) and reports the total mean score, standard deviation and interpretation. Table 3 presents the set of information related to the profile of the second research instrument administered to the respondents. It shows the means and the standard deviations for all the responses gathered from the total of 199 married basic education teachers on the FWCS while Table 4 presents the descriptive statistics for FWCS for the full sample (N=199) and reports the total mean score, standard deviation and interpretation. Table 5 presents the set of information related to the profile of the third research instrument conducted to the respondents. It reports the responses of all 199 married basic education teachers on the GJSS while Table 6 presents the descriptive statistics for GJSS for the full sample (N=199) and reports the total mean score, standard deviation and interpretation. Table 7 presents the existing relationship among work-family conflict, family-work conflict and job satisfaction.

Table 1: Descriptive Statistics for the Work-Family Conflict Scale

Items	N	Min.	Max.	M	SD
1. The demands of my work interfere with my home and family life.	199	1.00	7.00	4.06	1.74
2. The amount of time my job takes up makes it difficult to fulfill family responsibilities.	199	1.00	6.00	3.85	1.63
3. Things I want to do at home do not get done because of the demands my job puts on me.	199	1.00	7.00	3.90	1.66
4. My job produces strain that makes it difficult to fulfill family duties.	199	1.00	7.00	3.50	1.57
5. Due to work-related duties, I have to make changes to my plans for family activities.	199	1.00	7.00	4.40	1.55

It can be inferred from Table 1 that there are scores in some items that can be significant in the over-all degree of work-family conflict for the respondents. Take for example, item number 5 (Due to work-related duties, I have to make changes to my plans for family activities) garnered the highest mean rating (M=4.40, SD=1.55) which tells about the respondents adjustments of plans to give way to work concerns. Likewise, item number 1 (The demands of my work interfere with my home and family life.) garnered the second highest mean rating (M=4.06, SD=1.74) that refer to the interference of work and family life. Also, the third item with the highest mean (M=3.90, SD=1.66), item number 3 (Things I want to do at home do not get done because of the demands my job puts on me.) is a reflection of sacrificing family concerns which cannot be accomplished because of work. Generally, it must be noted that two items (1 and 5) got a mean higher than 4 which is supposedly the mean with 1 being the lowest response and 7 being the highest.

The understanding of how work-family conflict impacts the lives of the teachers is important. As highlighted in the study conducted by Grant-Vallo and Donaldson in 2001, work-family conflict can predict employee well-being and a manifestation of employee's positive well-being and the anxiety and fatigue caused by strain from one role may hinder the performance of another role (Frone, Russell & Cooper, 1997)

Table 2: Descriptive Statistics for Work-Family Conflict Scale for the Full Sample (N=199)

Item	N	M	SD	Interpretation
Work-Family Conflict	199	3.94	1.63	

For further explanation and interpretation, a total mean score below 4 (on a 7-point scale) indicated favorable degree of work-family conflict. Moreover, a total mean score of 4 denoted moderate degree of work-family conflict.

Furthermore, a total mean score above 4 suggested unfavorable number of work-family conflict. Using the previously set criteria, Table 2 showed the low degree of work-family conflict experienced by the respondents as reflected on their total mean score of 3.94. It must be taken into consideration, though, that their total mean score is almost 4 which means they can experience moderate degree of the said conflict. Also, the responses were varied as shown on the standard deviation of 1.63.

Work-family conflict is a concern that must not be taken for granted because such could have detrimental effects. This was highlighted in the study conducted by De Leon in 2012. Said researcher conducted a study that focused on how urban Filipino parents teach and promote "mabutingasal" among preschool children. In the study, De Leon discovered that compared to other parents in any other group, working mothers used physical punishment to discipline their children.

Table 3: Descriptive Statistics for the Family-Work Conflict Scale

Items	N	Min.	Max.	M	SD
1. The demands of my family or spouse/partner interfere with work-related activities.	199	1.00	6.00	3.44	1.59
2. I have to put off doing things at work because of demands on my time at home.	199	1.00	7.00	3.33	1.61
3. Things I want to do at work don't get done because of the demands of my family or spouse/partner.	199	1.00	7.00	2.98	1.50
4. My home life interferes with my responsibilities at work such as getting to work on time, accomplishing daily tasks, and working overtime.	199	1.00	7.00	3.18	1.57
5. Family-related strain interferes with my ability to perform job-related duties.	199	1.00	7.00	3.09	1.40

On the other hand, Table 3 shows the gathered means and standard deviation of responses from the respondents of the FWCS. The result of each items is essential and significant to the respondents' overall degree of family-work conflict. For example, item no.1 (The demands of my family or spouse/partner interfere with work-related activities.) got the highest mean rating (M=3.4, SD=1.59) which implies that family-related matters interfere with work. Additionally, item no.2 (. I have to put off doing things at work because of demands on my time at home.) garnered the second highest mean rating (M=3.33, SD=1.61) which indicates work is, most of the times, interrupted by family concerns. Generally, it is worth-noting that no item got a mean higher than 4. This is parallel with the result of the study conducted by Erdamar and Demirel (2016) where teachers suffered work-family conflict in comparison to family-work conflict. Therefore, family-work conflict was more favourable than conflict of work to family.

Table 4: Descriptive Statistics for Family-Work Scale for the Full Sample (N=199)

Item	N	M	SD	Interpretation
Work-Family Conflict	199	3.20	1.53	

Correspondingly, for further interpretation, a total mean score below 4 (on a 7-point scale) indicated favorable degree of family-work conflict. Moreover, a total mean score of 4 denoted average level of family-work conflict.

Furthermore, a total mean score above 4 suggested unfavorable number of family-work conflict. Based on the statistical criteria, it might be an observationally deduced that the respondents garnered a favourable degree of family-work conflict as evident in the total mean score of 3.20 which is obviously justified by the former range of values defined (M > 4). Also, the responses were varied as suggested on the standard deviation of 1.53.

The Filipino notion of a family was reflected through the low degree of family-work conflict underwent by the respondents of the study. Tarroja (2010), with reference to existing research, emphasized that what defines a Filipino family is not so much on the structure but more on the emotional connections among family members, the way they relate, support and care for each other.

Relationships are given primary importance in the Filipino culture. Also, the lower total mean score of family-work conflict compared to work-family conflict reflects the supremacy of household over work in the Filipino culture.

Table 5: Descriptive Statistics for the Global Job Satisfaction Scale

Items	N	Min.	Max.	M	SD
1. I receive recognition for a job well done.	199	1.00	5.00	3.73	.68
2. I feel close to the people at work.	199	1.00	5.00	4.01	.56
3. I feel good about working for this company (school).	199	2.00	5.00	4.05	.53
4. I feel secure about my job.	199	2.00	5.00	4.06	.66
5. I believe management (administration) is concerned about me.	199	1.00	5.00	3.71	.79
6. On the whole, I believe work is good for my physical health.	199	1.00	5.00	3.68	.92
7. My wage (salary) is good.	199	1.00	5.00	3.03	1.14
8. All my talents and skills are used at work.	199	1.00	5.00	3.90	.71
9. I get along with my supervisors (immediate heads).	199	1.00	5.00	3.72	.76
10. I feel good about my job.	199	2.00	5.00	4.00	.62

Table 5, conversely presents the means and standard deviations of the responses collected from the respondents of the study to the GJSS. Also, there are results in certain items that may possibly be significant in the respondents' overall degree of job satisfaction. For instance, item no. 4 (I feel secure about my job) gained the highest mean rating (M=4.06, SD=.66) which discusses about the job security. Likewise, item no. 3 (I feel good about working for this company/school) take up the second highest mean rating (M=4.05, SD=.53) which refers to the respondents feeling towards the school. It is worth-noting that all of the mean score were above 3 which is supposedly the mean with 1 being the lowest and 5 being the highest.

The importance of job security was previously acknowledged by Senol (2011) who believed that it is impossible for an employee to be motivated if he/she frequently fears the future of his/her profession. Additionally, according to the Society for Human Resource Management (2012), with reference to the surveys they conducted, only two aspects of job satisfaction remained to be in the top five aspects of job satisfaction since 2002 and job security was one of them while Sousa-Poza and Sousa-Poza (2000) found job security to be one of the job satisfaction factors.

Table 6: Descriptive Statistics for Global Job Satisfaction Scale for the Full Sample (N=199)

Item	N	M	SD	Interpretation
Job Satisfaction	199	3.79	.74	

Using the guide in the published article for the GJSS, with the mean score of 3.79 being multiplied by 20 considering that there are 10 items, a score of 37.9 is considered high. Traits of high scorers include few sleeping difficulties, pleased in individual life, don't feel exhausted towards the end of the day, don't request counseling and seldom become anxious. Job satisfaction reflects how contented one is with the job. The standard deviation reflects minimal dispersion.

This result is parallel with the results of the study by Maeran, Pitarelli and Cangiano (2013) where majority of their teacher-respondents described feeling gratified with their jobs with adjectives for example interesting, useful, satisfying, exciting, good, creative, active and pleasant obtaining consensus greater than 84%. A massive part of their sample took into account their job motivating and would barely replace it with a different one.

Table 7

Correlational coefficient among Work-Family Conflict, Family-Work Conflict and Job Satisfaction Items	r-value	p-value
Work-Family Conflict and Family-Work Conflict	.600	.00
Work-Family Conflict and Job Satisfaction	-.241**	.00
Family-Work Conflict and Job Satisfaction	-.213**	.00

\*\*relationship significant at 0.01 level.0

As can be observed from Table 7, there is a significant positive relationship between work-family conflict and family-work conflict. This means that scores move in the same directions, as one score goes up, the other follow and vice versa. It can be inferred that those who score highly in the WFCS also score highly in the FWCS, and vice versa. Grzywacz and Marks (2000), with reference to several studies, found that work and family factors that enabled development like that of decision latitude and family support were related to less

negative and more positive spillover between work and family. On the contrary, work and family hindrances like job strain and family conflicts were connected with further negative spillover and less positive spillover between work and family.

As to work-family conflict and job satisfaction, a significant negative correlation was established. This means that those who score highly in work-family conflict tend to score lowly in job satisfaction, and vice versa. This was parallel with the findings of an earlier study conducted by Erdamar and Demirel (2016) where work-family conflict predicted job satisfaction.

A significant negative correlation was likewise established among family-work conflict and job satisfaction. This means that those who score highly on family-work conflict do score lowly in job satisfaction and vice versa. This is can somehow be attributed to the increase in the acceptance of work to spill-over into private lives (Center for Advanced Human Resource Studies, 2010).

In general, the results from present study supported the Spillover Theory which claims that affect is segmented in an array of life domains- family life, leisure life, community life, and work life. Spillover between the work micro system and the family micro system may be positive or negative (Willensky, 1960). When work-family relations are strictly arranged in time and space, then spillover in terms of time, energy and behavior is mostly negative. On the other hand, when there is flexibility, which permits people to incorporate work and family obligations in time and space, positive spillover is achieved which is contributory to the achievement of healthy work and family balance (Hill, Fellis&Matinson, 2003)

## V. CONCLUSION

Through utilizing a descriptive correlational research design, the researcher was able to show the significant positive relationship between work-family conflict and family-work conflict. This only implies that conflict between work and family and family and work are hardly separated. As the Spillover Theory suggest, one concern on one sphere may bleed to the other. Job satisfaction in contrast, which is considered to be a positive feeling to one's work have been proven in this study to be negatively related to both work-family conflict and family-work conflict. This only shows again that one sphere affects the other.

It must be noted though and with reference to Kengatharan (2015) that study has verified that work-family conflict encompasses its personal flavor around various nations and cultures. This may also be true to family-work conflict and job satisfaction. Therefore, organizational policy makers must consider culture when working with people.

### A. Implications to Educational Management

The findings will help school managers understand holistically innumerable factors which may possibly play a part in the development of teachers' lives. Moreover, this will be meaningful too in the practice of Guidance and Counselling and other helping professions because it will allow guidance counselors and helping professional support teachers causing them achieve balance in life. Designing programs that deals with the realization of positive and happy conditions among teachers is a comprehensive and feasible alternative.

### B. Limitations of the Study

Undoubtedly, this research is affected by many things. These include the peculiarities of the sample where females outnumbered the males, the geographical framework, and subjective performance requirements by schools where the respondents are employed. It is therefore suggested that a similar research be conducted in different countries that a parallel research be conducted in other perspectives, with the same number of males and females. A longitudinal study that will track changes in response to demands and school conditions is also a worthwhile endeavor.

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## An Analysis of the Senior Employment Programs for Wellness in Changwon City Hall Based on Blended Return on Investment

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### Abstract---

The main purpose of this study is to evaluate the feasibility of using the Blended Return on Investment (BROI), Economic Return on Investment (EROI) and Social Return on Investment (SROI) for assessing sustainability of senior employment programs (SEPs), social values and impacts that the SEPs has on the senior community. For this study, three organizations running the SEPs are considered: a preliminary social enterprise obtained authorization from Changwon City Hall, a community welfare center, and a commercial enterprise obtained authorization from a government body called Korea Labor Force Development Institute for the Aged (KLFDI). Each organization's return on investment is calculated and compared using the formula stated below. EROI, SROI, and BROI are all found to be the highest in the SEP run by the preliminary social enterprise. However, when only EROI and SROI are compared, the SEPs run by the commercial business have the highest social impacts.

**Keywords---** Senior Employment Programs (SEPs), Blended Return on Investment (BROI), Economic Return on Investment (EROI), Social Return on Investment (SROI).

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## **I. INTRODUCTION**

At present in South Korea, SEPs are active and their sustainability is an important issue. The purpose of employment programs for seniors is to provide both material and income support, but the programs alone could not provide enough support. Hence, it was inevitable to establish a social enterprise which expanded to a market-oriented enterprise. In addition, there have been continuous efforts to create more jobs for seniors.

While these programs are well-received, there is not even one well-established method to evaluate their sustainability or socioeconomic impacts. The absence of such well-established method means it will be difficult to make an objective evaluation of senior programs. It will eventually lead to receiving less support from the government and private organizations and inhibiting senior employment programs.

This study attempts to evaluate social and economic impacts and outcomes of SEPs by using the approach for evaluating Robert Enterprise Development Fund (REDF) and New Economic Foundation (NEF). The Blended Return on Investment (BROI), Economic Return on Investment (EROI) and Social Return on Investment (SROI) of the programs in three enterprises are calculated and compared to assess the possibility of continuing the senior programs, and social values and impacts that it has on the senior community.

## **II. SENIOR EMPLOYMENT PROGRAMS OF GEUMKANG SENIOR WELFARE CENTER**

### **A. Senior Employment Programs (SEPs)**

In South Korea, SEPs are operated by both public and private organizations, namely

- 1) The government.
- 2) The local government.
- 3) And private organizations.

While these programs are well-received, there is not even one well-established method to evaluate their sustainability or the socioeconomic impacts. The absence of such well-established method means it will be difficult to make an objective evaluation of SEPs. Moreover, it will eventually lead to receiving less support from the government and private organizations and inhibit SEPs. For this study, three organizations running the SEPs are considered. Senior employment details are as follows:

- 1) Assembling products to supply local small to medium-sized businesses, and a preliminary social enterprise obtained authorization from Changwon City Hall.
- 2) Working at coffee shops in a community welfare center as qualified baristas.
- 3) Working in a commercial enterprise obtained authorization from KLFDI as a courier delivering goods in an apartment complex.

### **B. Returns on Investment**

BROI refers to a social return on investment and an economic return on investment.

SROI is a principle-based method for measuring extra-finances related to resources invested. It can be used to assess risks that stakeholders may hold as well as suggest different ways for improvement and enhancement of the performance on investment. It has been standardized by the 'SROI Network', which means you can expect to see consistent results in managing the impacts of a project, business, organization, fund and/or policy. It accounts for stakeholders' views on these impacts. It includes the values people hold which are often excluded from market research where the factors related to money are the main concern. This is deliberately done to let people have a voice in resource allocation decisions.

An analysis of social returns explains the change in social returns and includes case studies and qualitative, quantitative and financial information. It depicts the changes in social, environmental and economic outcomes and uses monetary values to represent them. Hence, SROI can help make decisions and influence investors

The concept of SROI is developed from social accounting and an cost-benefit analytic approach, and is based on seven principles. These principles are summarized below:

- 1) Involve stakeholders: They should be provided with information about what is measured and how it is done and what is valued.

- 2) Understand what changes are involved: Changes can be positive or negative, intentional or unintentional. Evaluate them based on evidence and state clearly the reasons for them.
- 3) Value the things that matter: Remember financial proxies can be used to recognize the value of outcomes, and not all outcomes are welcomed in markets or their value.
- 4) Only include what is necessary: Prepare what stakeholders need to draw conclusions on social impacts.
- 5) Do not make claims more than necessary: Only make claims based on the values that organizations hold.
- 6) Be transparent: Demonstrate on what basis the analysis is accurate and honest, and report and discuss it with stakeholders.
- 7) Verify the result: Make sure appropriate and independent assurance is provided.

A methodology for calculating SROI in the context of social enterprises was first documented in 2000 and was applied on Roberts Enterprise Development Fund (REDF)[2]. Then it was used in the cost-benefit analysis of San Francisco-based philanthropic fund, a long-term grant given to organizations that run businesses for social benefits. Since then, the methodology has evolved to take into account developments in corporate sustainability as well as developments in the field of accounting for social and environmental impacts. The evolution has been fuelled by the increasing recognition of the metrics important to managing impacts that were not included in traditional profit and loss accounting. These metrics focused on outcomes over outputs. While SROI builds on the logic of cost-benefit analysis, it is different in that it is explicitly designed to assist in practical decision-making of enterprise managers and investors whose main interests are optimizing social and environmental impacts. A cost-benefit analysis is a technique rooted in social science that is most often used by funders outside an organization to determine whether their investment or grant is economically efficient[2].

In financial management, the term ROI refers to a single ratio. A social analysis refers not to one single ratio but more to a way of reporting on value creation. It bases the assessment of a value in part on the perception and experience of stakeholders, finds indicators of what has changed and explains it and, where possible, uses monetary values for these indicators. It is an emerging management discipline[8, 9, 10].

Essentially, the monetization principle assumes that price is a proxy for value. However while price may represent the exchange value it might not completely represent all the value to either the seller or the consumer or to others who may be affected. And prices will depend in part on the distribution of income and wealth[14]. The use of monetary proxies for social, economic and environmental values offers several practical benefits:

- 1) It integrates performance management systems with financial management systems.
- 2) It aids communication with internal stakeholders.
- 3) It induces transparency and precipitates the clarification of values.
- 4) It permits a sensitivity analysis where assumptions are more important than results.
- 5) It helps identify the critical sources of value and performance management.

In mid-1990's Roberts Enterprise Development Fund (REDF) raised questions such as "How can we measure our success?", "How can our practitioners and investors know if they are achieving goals they set at first?", "How can they make prudent decision about making use of resources?", and "How can we prove that money invested in our company is being used to benefit individuals and society in a quantitative way?" To answer these questions, it developed SROI concept. It quantifies economic and social effects of social enterprises. Also it categorizes benefits of social ventures as a corporate value and social objective value which comprise the 'Herds value'[15, 16]. This value consists of a corporate value, social objective value, and liabilities.

- 1) Corporate value = (-) Expense spent on sold goods and services  
(-) Operating expense
- 2) Social objective value = (+) Funding and donation

(-) Fund raising cost and donation registration cost

(+) Reduction of social expense

(-) Social operating expense

(+) Increased revenues

3) Liabilities = (-) Debt of social enterprise

Nonprofit organization faces tension between net income and mission fidelity. Revenue and mission of nonprofit organization are related in interesting way [15, 16]. To measure the financial vulnerability of a nonprofit organization, the following factors can be used.

4) Equity balance: (Asset-Liability)/Total revenue

5) Revenue Concentration

6) Administrative costs: Expenditure on administration/Total expense

7) Operating margin: (Total revenue - Total expense)/Total revenue

8) Return on investment: (Total income - Total expenditure)/Net assets

The Korean SROI developed by the Socially Responsible Management Center of KAIST, is a tool that converts a social value into an economic indicator to measure the social and economic results of social enterprises. It published 'A Guide to the Assessment of Value Creation in Social Enterprises' in 2009, a model to measure social outcomes of social enterprises. It was used to collect opinions from academia in the field on the utilization and application of social analyses. It has been developed as the necessity arose for a tool to evaluate social values. Wonju Health Cooperative in Korea and the Beautiful Store in Korea explained that the recognition of values and significance of them had not yet been settled in the field of social entrepreneurship and the business world that represents potential investors. The institutions added that various models to measure business outcomes could provide tools to understand the nature of social enterprises more systemically. They also expressed the desire for developing models adequate for applications in the field. In response to this, it must open up data and information on social enterprises in Korea, in order to objectify data, suggest and implement reasonable policies. It can be emphasized the necessity for an indicator to reveal values of social enterprises so as to guarantee their growth through capital investment and survival in the market. They also suggested specific plans such as visualization of transparency through releasing basic information to the public. Then, expressed concern about the possibility that the social model would remain only as a tool to evaluate policy implementation results rather than practically support social enterprises and it emphasized the necessity to develop a macroscopic model to evaluate sustainability of every enterprise, including the soundness of social enterprises.

For this study, three organizations running the senior programs are considered. A preliminary social enterprise obtained authorization from Changwon City Hall, a community welfare center, and a commercial enterprise obtained authorization from a government body known Korea Labor Force Development Institute for the Aged (KORDI). Each organization's blended analysis is calculated and compared using the formula stated below. Before the calculation, the data is checked and a series of interviews are carried out as part of the sensitivity analysis.

$$\text{BROI} = \text{EROI} + \text{SROI}$$

Where BROI = Blended Return on Investment, (Economic benefit-cost) + (Social benefit-cost)

EROI = Economic Return on Investment (Economic benefit-cost)

SROI = Social Return on Investment (Social benefit-cost)

### III. RESULTS

The basic assumptions are the following: the performance period is 2 years, discount rate 3.5%, average inflation rate 4.0% according to the Bank of Korea in Year 2011, and the level of significance  $\pm 20\%$ . EROI, SROI, and BROI are all found to be the highest in the case of the senior programs in the preliminary social enterprise. However, when only EROI and SROI are compared, the senior programs in the commercial enterprise have the highest values.

**A. The Senior Employment Program run by one Preliminary Social Enterprise Obtained Authorization from Changwon City Hall has the Following Results**

Table 1: ROI Result (1)

ROI	money (man won)	Score
Economic benefit	13,800	-
Economiccost	8,000	-
EROI		1.768
Social benefit	22,100	-
Social cost	8,199	-
SROI		10.715
BROI-		12.483

**B. The Senior Employment Program Run by one Community Welfare Center has the Following Results**

Table 2: ROI Result (2)

ROI	money (man won)	Score
Economic benefit	2,440	-
Economiccost	2,290	-
EROI		0.791
Social benefit	1,830	-
Social cost	0	-
SROI		9.926
BROI		10.717

**C. The Senior Employment Program Run by a Government Body called Korea Labor Force Development Institute for the Aged(KORDI) has the Following Results**

Table 3: ROI Result (3)

ROI	money (man won)	Score
Economic benefit	943	-
Economiccost	737	-
EROI-		0.387
Social benefit	5,890	-
Social cost	1,800	-
SROI-		7.682
BROI-		8.069

**D. The Senior Employment Program Run by one Preliminary Social Enterprise Obtained Authorization from Changwon City Hall has the Following Sensitivity Analysis**

Table 4: Sensitivity Analysis Result

Impact indicators	The basic assumption	The new assumption	SROI	BROI
Participants	28 people	22people	7.533	9.301
		34people	13.898	15.666
The average monthly salary	KRW 500,000	KRW 400,000	7.746	9.514
		KRW 600,000	13.687	15.455
Income tax	15%	12%	11.102	12.87
		18%	10.330	12.098

#### IV. CONCLUSION

This study attempts to evaluate social and economic outcomes of the Senior Employment Programs (SEPs) by using the approach used to evaluate Robert Enterprise Development Fund (REDF) and New Economic Foundation(NEF). The Blended Return on Investment (BROI), Economic Return on Investment (EROI) and Social Return on Investment (SROI) of the senior programs in three enterprises are calculated and compared which are then used to assess the possibility of continuing senior program and social values and influences that BROI has on the senior community.

For this study, three organizations running the Senior Employment Program are considered, which provided the following jobs:

- 1) Assembling products to supply local small to medium-sized businesses, in a preliminary social enterprise obtained authorization from Changwon City Hall.
- 2) Working at coffee shops in a community welfare center as qualified baristas.
- 3) Working as a courier delivering goods in an apartment complex, provided by a commercial enterprise obtained authorization from Korea Labor Force Development Institute for the Aged (kordi)from government.

The Blended Return on Investment (BROI) is calculated and compared. Before the calculation, the data is checked and a series of interviews are carried out as part of the sensitivity analysis. First, EROI and SROI of the senior programs are all high in all three senior programs. This means all of the senior programs considered in this study are socially beneficial. Second, according to the result of the sensitivity analysis, the variables that affect the blended return on investment do not indicate the increment in income tax, but the saving of government subsidies and the increment in real income as well as the average monthly income of the senior clients in the senior programs have been noticed. Third, the major interest of senior citizens are found to be having more senior clients embracing the programs.

Hence, if social enterprises running the senior programs continue to have high blended ROI, It will remain to be an effective program. However, while a senior program in a social enterprise seems to be successful with the seniors who are able to support themselves, it does not seem to be so successful with the others. It is necessary to do further research about senior program models that can meet the needs of those who are less able to support themselves.

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## Factors Affecting Drinking Behavior in College Students

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### Abstract---

**Background/Objectives:** This research is a descriptive study to determine the factors which affect the drinking behavior of college students.

**Methods/Statistical analysis:** The data were collected by 308 college students located in C province who agreed to participate in this study. This study was analyzed using descriptive statistics, T-test and ANOVA. Pearson's correlation coefficient analysis was used to identify the effects of social norms and family history on college problem drinking. Hierarchical regression was used to determine the factors which affect problem drinking among college students.

**Findings:** There were statistically significant positive correlations between problem drinking and the following factors: drinking attitudes ( $r=.145$ ,  $p<.05$ ), subjective norms ( $r=.125$ ,  $p<.05$ ), drinking intention ( $r=.486$ ,  $p<.01$ ), parent descriptive norms ( $r=.281$ ,  $p<.01$ ), friend descriptive norms ( $r=.426$ ,  $p<.01$ ), general college student descriptive norms ( $r=.319$ ,  $p<.01$ ), paternal problem drinking ( $r=.150$ ,  $p<.01$ ), and maternal problem drinking ( $r=.128$ ,  $p<.05$ ). Hierarchical regression analysis revealed that the following factors exert a significant influence on college problem drinking: religion ( $B=.679$ ,  $p<.05$ ), perceived behavioral control ( $B=-.824$ ,  $p<.001$ ), friend descriptive norms ( $B=.659$ ,  $p<.001$ ), and maternal problem drinking ( $B=.451$ ,  $p<.05$ ). The total explanatory power was shown to be 53.4%.

**Improvements/Applications:** This study shows factors that affecting drinking behavior in college students. Educational authorities need to know increasing alcohol consumption for college students in relation to their problem drinking behavior and to support that.

**Keywords---** Alcohol, Paternal, Problem Drinking, College Student Drinking.

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## **I. INTRODUCTION**

College, which can be seen as either the first stage of adulthood or the final stage of adolescence, is a life-development stage which entails rapid changes in one's environment. It is a time when one achieves independence from one's parents while having to establish one's self-identity<sup>1</sup>. Additionally, it is a period when drug abuse and other harmful behaviors increase. Thus, it is an important development stage in which one learns one's role as an adult<sup>2</sup>. In a survey of 3,964 college students conducted by the Korean Alcohol Research Foundation in 2010, 27.5% of male students and 28.7% of female students replied that they consume alcohol 3-5 times per week. In 2010, an online job portal conducted a survey of 630 respondents to determine the status of college student drinking. In response to the question, "Do you know your drinking capacity?" 43.6% of college students replied, "Yes, but I often consume alcohol in excess of my capacity." Each year, there is an endless stream of unfortunate alcohol-related incidents because so many college students exceed their limits. College drinking is a significant public health concern which is growing in spite of health promotion activities and programming. College students have been found to drink more heavily and frequently than others, and heavy drinking may lead to academic problems, criminal behaviors, injuries, and death<sup>1</sup>. Meanwhile, in the United States, college students reported that drinking alcohol at university was considered a ritual, and about 60% of people aged 18-22 reported having drunk alcohol<sup>3</sup>.

## **II. LITERATURE REVIEW**

Foreign research shows that the children of problem drinkers have high rates of alcohol and drug usage and that they are 4-5 times more likely than the children of non-drinkers to become alcohol abusers<sup>4</sup>. Thus, there is a tendency for the problem of alcoholism to cross generations in a vicious cycle. Domestic research<sup>5</sup> shows that the children of problem drinkers have a higher probability of experiencing problem drinking than the children of regular households. Keller, Cummings, & Davies (2005) report that Parental problem drinking is related to alcohol dependence, abuse, and other maladaptive drinking patterns, and alcohol-related problems<sup>6</sup>.

According to Wilson (1997), the children of problem drinkers frequently use alcohol and drugs, and they are 4-5 times more likely to become alcohol ab users than the children of non-drinkers<sup>7</sup>. Many studies in this country show similar results<sup>6</sup>.

In the literature on problem drinking, many studies show that paternal problem drinking tends to affect the children of problem drinkers. Therefore, the purpose of this study is to analyze the influence of family drinking on college student drinking. We hope the results of this analysis can facilitate a better understanding of college drinking and can serve as the basis for developing effective prevention programs.

## **III. PROPOSED WORK**

### ***Study Subjects and Ethical Considerations***

The data was collected via structural questionnaires completed by 308 college students who agreed to participate in this study. All data used was collected according to the approved guidelines and screening procedures of "S University".

### ***Test Participants & Test Method***

We obtained a sample of 308 college students. Statistical analysis was performed using mean, standard deviation, T-test, ANOVA, Pearson's correlation and Hierarchical regression using SPSS 20.0.

### ***A. Instruments***

#### ***Planned Behavior***

Planned behavior is a motivational factor intended in a particular way<sup>8</sup>. In this study, it refers to the belief that people can withstand the temptation of alcohol<sup>9</sup>. The Planned behavior scale consists of four items: drinking attitude, subjective norms, perceived descriptive norms, and drinking intention<sup>10</sup>. Higher scores indicate greater problems with perceived behavioral control. Cronbach's  $\alpha$  was .89 in the present study.

### ***Family Problem Drinking***

The Family problem drinking scale was developed by Hodings & Shimp in 1955<sup>11</sup>. The Family problem drinking questionnaire consists of two items: paternal problem drinking and maternal problem drinking. Higher scores indicate more problem drinking. This instrument's Cronbach's  $\alpha$  was .83 and the original scale was .89.

### ***Social Descriptive Norms***

Descriptive norms describe actual behavior rather than beliefs about others, including approval or disapproval of behavior<sup>12</sup>. The social descriptive norms scale consists of three items: parent descriptive norms, college student descriptive norms, and close friend descriptive norms. Higher scores indicate greater alcohol consumption and frequency. Cronbach's  $\alpha$  was .83 in the present study.

### ***College Student Problem Drinking***

The Problem drinking scale was developed by the WHO (AUDIT) and was modified by Lee et al (2010). The scale consists of 10 items with a five-point scale for each. Higher scores indicate higher levels of problem drinking. Cronbach's  $\alpha$  was .82 in the present study.

## **IV. FINDING**

### ***General Characteristics***

Descriptive analysis. The general characteristics of the participants are shown in Table 1. The study participants included 50 males (16.2%) and 258 females (83.8%). The students' majors were as follows: 204 nursing students (66.2%), 14 oriental food & nutrition students (4.5%), and 75 students with other majors (24.4%). Ranking scales were used to measure the key factors, and the average overall mean scores were as follows: perceived drinking attitude (26.43 $\pm$ 7.72), problem drinking (18.37 $\pm$ 6.69), drinking intention (11.19 $\pm$ 7.73), parent descriptive norms (7.75 $\pm$ .44), and friend descriptive norms (9.78 $\pm$ .48). There were statistically significant positive correlations between problem drinking and the following factors: drinking attitude ( $r=.145$ ,  $p<.05$ ), subjective norms ( $r=.125$ ,  $p<.05$ ), drinking intention ( $r=.486$ ,  $p<.01$ ), parent descriptive norms ( $r=.281$ ,  $p<.01$ ), friend descriptive norms ( $r=.426$ ,  $p<.01$ ), general college student descriptive norms ( $r=.319$ ,  $p<.01$ ), paternal problem drinking ( $r=.150$ ,  $p<.01$ ), and maternal problem drinking ( $r=.128$ ,  $p<.05$ ). There was a statistically significant negative correlation between problem drinking and perceived behavioral control ( $r=-.650$ ,  $p<.01$ ) (Table 2).

Differences in planned behavior, family problem drinking, descriptive social norms, and college problem drinking among college students according to general characteristics are shown in Table 1. The general characteristics on planned behavior showed statistically differences according to religion ( $F=3.295$ ,  $p=.023$ ). There were statistically significant effects on family problem drinking according to the following general characteristics: major ( $F=2.828$ ,  $p=.039$ ), religion ( $F=3.295$ ,  $p=.021$ ), and economic status ( $F=2.524$ ,  $p=.041$ ). Social descriptive norms showed significant differences according to religion ( $F=3.195$ ,  $p=.024$ ).

To identify the effects of planned behavior, social descriptive norms, and family problem drinking on college problem drinking, a Hierarchical regression model was used. They are shown in table 3. Step 1 was found that college problem drinking increases with religion ( $B=.679$ ,  $p<.05$ ). Thus, religion was shown to have an explanatory power of 2.3% with regard to college problem drinking. In Hierarchical Step 2, adding planned behavioral factors increased the explanatory power by a statistically significant 42.8%. It was found that college problem drinking increases with planned behavioral control ( $B=-.824$ ,  $p<.001$ ). Thus, planned behavioral control was shown to have an explanatory power of 44.1% with regard to college problem drinking. In Hierarchical Step 3, social descriptive norms and family problem drinking were added, and the explanatory power increased by a statistically significant 51.5%. It was shown that friend descriptive norms ( $B=.659$ ,  $p<.001$ ) and maternal problem drinking ( $B=.451$ ,  $p<.05$ ) exert a significant influence on college problem drinking. The total explanatory power of these factors on college problem drinking was shown to be 53.4%.

Table 1: General Characteristics & Relationships between Perceived Behavioral Control, Paternal Descriptive Norms, Family Problem Drinking, and College Problem Drinking

(N=308)

Variable	Category	N (%)	Planned behavior			Family problem drinking			Social descriptive norms			College drinking behavior		
			M (SD)	t/F	p	M (SD)	t/F	p	M (SD)	t/F	p	M (SD)	t/F	p
Sex	Male	50 (16.2)	48 (28.35)	1.500	.135	19.54 (5.57)	-1.588	.113	7.56 (3.10)	-.433	.665			
	Female	258 (83.8)	26.06 (9.30)			18.15 (5.69)			7.79 (3.51)					
Year of college	1st	102 (33.1)	17.40 (5.02)	1.862 <sup>†</sup>	.589	17.40 (5.59) <sup>a</sup>	1.862	.136	7.34 (3.56)	.877	.453	26.09 (9.66)	2.038	.109
	2nd	108 (35.1)	19.10 (6.44)			19.10 (6.43) <sup>a</sup>			7.81 (3.28)			26.02 (9.86)		
	3rd	87 (28.2)	18.43 (5.54)			18.43 (5.54) <sup>a</sup>			8.05 (3.50)			26.47 (9.36)		
	4th	11 (3.6)	19.91 (3.86)			19.91 (3.86) <sup>b</sup>			8.55 (3.75)			33.80 (10.70)		
Major	Nursing	204 (66.2)	11.13 (4.71)	.156	.926	16.49 (5.59) <sup>a</sup>	2828	.039 a<b	7.69 (3.65)	.190	.903	26.15 (9.14)	2.245	.083
	Police administration	15 (4.9)	11.13 (5.25)			22.07 (7.70) <sup>b</sup>			7.60 (3.29)			23.79 (12.75)		
	Oriental food & nutrition	14 (4.5)	12.00 (3.82)			20.00 (3.86) <sup>ab</sup>			8.36 (3.63)			32.50 (8.57)		
	Other	75 (24.4)	11.08 (4.73)			18.33 (5.56) <sup>a</sup>			7.84 (2.90)			26.52 (10.60)		
Religion	Protestant	66 (21.4)	9.68 (5.08) <sup>a</sup>	3.295	.023 a<b	16.49 (5.31) <sup>a</sup>	3.295	.021 a<b	6.62 (3.67) <sup>a</sup>	3.195	.024 a<b	24.30 (9.61)	1.370	.252
	Catholic	32 (10.4)	12.25 (4.32) <sup>ab</sup>			18.41 (5.87) <sup>ab</sup>			7.75 (3.07) <sup>ab</sup>			27.13 (8.49)		
	Buddhist	22 (7.1)	12.14 (4.76) <sup>b</sup>			19.91 (6.73) <sup>b</sup>			8.59 (2.77) <sup>b</sup>			27.50 (9.12)		
	None	188 (61.0)	11.37 (4.58) <sup>b</sup>			18.82 (5.56) <sup>ab</sup>			8.04 (3.44) <sup>ab</sup>			26.95 (10.00)		
Assessed health status	Very healthy	57 (18.5)	11.46 (5.24)	.821	.483	19.61 (5.80)	1.613	.186	7.37 (3.51)			27.93 (10.76)	1.762	.154
	Healthy	166 (53.9)	11.32 (4.48)			17.81 (5.23)			8.02 (3.54)			26.84 (9.35)		
	Neutral	61 (19.8)	10.31 (4.59)			18.42 (5.94)			7.62 (3.20)			25.25 (9.67)		
	Not healthy	24 (7.8)	11.46 (5.54)			19.25 (7.41)			7.13 (3.28)			23.13 (9.45)		
Recognized problems	None	87 (28.2)	10.61 (4.84)	1.027	.402	18.40 (5.47)	.067	.694	7.79 (3.41)			26.6 (9.95)	.603	.698
	Financial situation	62 (20.1)	10.93 (4.75)			19.29 (5.95)			7.89 (3.56)			26.58 (10.08)		
	Family disease	11 (3.6)	11.90 (4.61)			19.18 (8.23)			9.30 (3.89)			25.36 (8.26)		
	Conflict with parents	9 (2.9)	13.00 (4.38)			18.78 (5.33)			8.13 (3.76)			31.00 (9.5)		
	Career issues	123 (39.9)	11.61 (4.58)			17.89 (5.56)			7.60 (3.28)			25.80 (9.72)		
	Other	16 (5.2)	9.94 (5.46)			17.60 (5.22)			7.00 (4.24)			27.94 (8.75)		
Residential status	Alone	17 (5.5)	10.41 (4.64)	1.554	.214	21.19 (6.16)	2.311	.058	7.12 (3.33)			21.00 (9.50)	2.164	.073
	With parents	206 (66.9)	10.98 (4.72)			17.98 (5.65)			7.75 (3.44)			26.43 (9.66)		
	Lives with relatives	5 (1.6)	13.60 (5.68)			20.40 (8.45)			10.40 (2.19)			34.20 (8.26)		
	Lives with friends	37 (12.0)	12.51 (4.34)			19.97 (5.52)			7.78 (3.69)			27.28 (9.22)		
	Other	43 (14.0)	10.86 (4.96)			17.65 (5.13)			7.71 (3.40)			26.84 (10.13)		
Financial situation	Very good	5 (1.6)	10.80 (7.46)	1.354	.177	17.80 (7.26) <sup>a</sup>	2.524	.041 a<b	6.60 (1.95)			31.20 (14.31)	.674	.610
	Good	52 (16.9)	11.67 (4.21)			19.08 (5.77) <sup>a</sup>			8.29 (3.25)			26.21 (9.43)		
	Neutral	153 (49.7)	10.93 (4.72)			18.14 (5.59) <sup>a</sup>			7.77 (3.42)			26.39 (9.42)		
	Difficult	87 (28.2)	11.38 (4.98)			17.78 (5.40) <sup>a</sup>			7.50 (3.75)			26.78 (10.30)		
	Very difficult	11 (3.6)	10.27 (4.73)			23.18 (6.63) <sup>b</sup>			7.55 (2.91)			23.00 (8.99)		

Table 2: Correlation of Independent Variables

	1	2	3	4	5	6	7	8	9
2	.274**								
3	-.218**	-.140**							
4	.293**	.500**	-.503**						
5	.153**	.124**	-.161**	.254**					
6	.237**	.239**	-.255**	.316**	.292**				
7	.217**	.157**	-.227**	.269**	.303**	.656**			
8	-.050	-.014	-.045	.109	.483**	.037	.012		
9	-.047	.035	.085	-.006	.169**	.006	.119**	-.148**	
10	.145*	.125*	-.650**	.487**	.281**	.426**	.319**	.150**	.128*

1. Drinking attitude 2. Subjective norms 3. Perceived behavioral control 4. Drinking intention 5. Parental descriptive norms 6. Friend descriptive norms 7. College student descriptive norms 8. Paternal problem drinking 9. Maternal problem drinking 10. Problem drinking

Table 3: Association of Perceived Behavioral Control, Paternal Descriptive Norms, Family Problem Drinking, and College Problem Drinking Hierarchical Regression

(N=308)

Variables	Step 1		Step 2		Step 3	
	B	SE	B	SE	B	SE
Constant	41.497		25.583		23.563	
Religion	.679*	.271	.482*	.208	.305	.195
Resides with parent	.206	.418	-.082	.216	-.100	.200
Financial situation	-1.326	-.106	.168	.319	.182	.302
Drinking attitude			-.024	.028	-.048	
Subjective norms			.047	.066	-.012	
Perceived behavioral control			-.824***	.059	-.740***	.056
Parent descriptive norms					.090	.321
Friend descriptive norms					.659***	.132
College student descriptive norms					-.014	.149
Paternal problem drinking					.123	.123
Maternal problem drinking					.451	.235
R2 ( $\Delta$ R2)	.023		.441 (.418)***		.534 (.515)***	
F	4.486***		36.224		28.201***	

## V. DISCUSSION

In this study, religion had statistically significant effects on family problem drinking. Julie et al report that students with no religious affiliation reported significantly higher levels of drinking frequency, quantity, and getting drunk<sup>13</sup>. Also, Henion and Harrell report that religious college students reported less alcohol use than their classmates and that the reason may have to do with how their parents handle stress, according to new research by a Michigan State University scholar<sup>14</sup>. Thus, this study's results are supported by the results of other studies.

This study shows statistically significant positive correlations between college student drinking attitudes and paternal and maternal problem drinking. Foreign research<sup>7</sup> shows that the children of problem drinkers have high rates of alcohol and drug usage and that they are 4-5 times more likely than the children of non-drinkers to become alcohol abusers. Thus, there is a tendency for problem drinking to cross generations in a vicious cycle. Domestic research<sup>4</sup> shows similar results which state that the children of problem drinking households have a higher probability of experiencing problem drinking than the children of normal households. In this study, planned behavioral control was shown to have an explanatory power of 44.1%

with regard to college problem drinking. Four items to date have examined the influence of drinking attitudes, subjective norms, perceived behavioral control, and drinking intention on college problem drinking. According to the theory of planned behavior, a certain set of motivational factors leads to an intention to act in a certain way<sup>8</sup>. If given the right opportunity, people will translate this intention into behavior. Several studies focusing on college drinkers have established the prediction of behavior by intention<sup>15, 16</sup>. Johnston and White (2003) report that the results of multiple regression indicated that attitudes, subjective norms, and self-efficacy significantly predicted 69% of the variance in intention to engage in heavy episodic drinking<sup>17</sup>. The results of these studies are similar to those of the current study. In the current study, social descriptive norms and family problem drinking were added, and the explanatory power increased by a statistically significant 51.5%. It was shown that friend descriptive norms ( $B=.659$ ,  $p<.001$ ) and maternal problem drinking ( $B=.451$ ,  $p<.05$ ) exert a significant influence on college problem drinking. Among college students, social norms are one of the strongest predictors of problematic drinking. Rinker and Neighbors (2003) report that, among college students, social norms were one of the strongest predictors of problematic drinking. Cognitive behavioral control and perceived descriptive norms were associated with drinking outcomes. College students who are very tempted to drink may drink more heavily and experience alcohol-related problems more frequently if they have greater perceptions that the typical student at their college drinks a lot<sup>18</sup>. This conclusion is supported by the current study. In addition, maternal problem drinking exerts a significant influence on college problem drinking. Christine (2012) explores parental problem drinking, communication between adolescents and parents, and psychosocial adaptation of adolescents. The results showed that father's problem drinking directly predicted son's alcohol and drug abuse, while mother's problem drinking predicted daughter's drug abuse<sup>19</sup>. Meanwhile, in this study, the effects of parental problem drinking did not vary significantly according to gender. This result is slightly different from the result of Christine's study. Several studies report that the role of parental gender is still inconclusive. A number of studies find that paternal drinking strongly predicts adolescent drinking<sup>20</sup>, whereas others emphasize the particular influence of maternal drinking<sup>21</sup>. Thus, this topic needs further study.

## VI. CONCLUSION

This research is a descriptive study to determine the relationship structure among planned behavior, social descriptive norms, and family problem drinking in terms of their influence on problem drinking among college students. However, since this research only considers a small sample of students, it will be difficult to extend the results of this study to other analyses, and follow-up studies must be carried out. We hope the results of this analysis can facilitate a better understanding of college drinking and can serve as the basis for developing effective prevention programs and . Educational authorities need to know increasing alcohol consumption for college students in relation to their problem drinking behavior and to support that.

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## A Study on Music Recommender System Based on Music Sites Using Learning Listener's Profile

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### Abstract---

**Objectives:** In a competitive power digital music market, this study presents adaptive recommending digital music pieces reflected by music genre and music style based on music sites using learning listener's profile.

**Methods/Statistical Analysis:** The system analyses the data set collected by music sites with its popular music charts on trends and a tight competition. It calculate the weights by each music site listeners preferred, with all genres and styles. It executes the task of preprocessing of clustering the category of music sites for recommender system.

**Findings:** Nowadays, listeners access various music databases through music site to find favorite musical pieces. However, the cause of the distortions in the digital music market caused by the recommended music function. It is lack of reasonable recommending service for fairer digital music services using online music sites. For doing that services, The system proposes music recommender system based on music site using learning listener's profile. It obtains 5 weights based on music sites which listener preferred using learning listener's profile. It generates the cluster of music data on online music site to join listener profile. It calculates listener's preference of all categories with all genres and styles by each music site. Our proposing system with weight based on music sites is higher 19% in precision, higher 15% in F-measure than the system without weight. It executes two task of preprocessing for clustering; One is clustering the category of genre and style of listener's music. The other is creating of clusters with neighborhood user-group by listeners' demographic variable, and music propensity.

**Improvements/Applications:** The system has the improvement that proposing system is higher 15% in F-measure than the other system without weight. It makes application for fairer digital music recommending service.

**Keywords---** Clustering, Bayesian Networks, Machine Learning, Clustering, Collaborative Filtering.

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## I. INTRODUCTION

Nowaday, some people choose to listen to music of all kinds. Along with the spread of digital music recent growth in the digital music industry, the demands for music recommender are increasing. And also, it is becoming a common life style of enjoying the digital music life using mp3 players and mp3 phone<sup>1</sup>. The demands for music portal sites and many different digital music pieces on music portal site are increasing rapidly. Online music sites they enjoy in is now toointense. The researches of music recommender system<sup>2,3</sup> have been actually processed to satisfy the needs for listeners and even help you to discover new artists. Otherwise, the music recommending function has many distortions in the digital music market. In this situation, proposing system presents music recommender system with weight based on online music sites, such as Melon, Billboard, Bugs Music, Soribada and Genie using learning listener's profile. Listener can access various music databases through online music sites to find favorite musical pieces by using retrieval system, and then they have to execute queries repeatedly by ourselves. To solve this problem, it is desirable that it is necessary for us to take the task of preprocessing of clustering of the category of music sites for listener's music in order to reflect the weight based on music sites with its popular music charts on trends.

### A. Collaborative Filtering (CF)

The collaborative filtering<sup>4</sup> uses the other users' preferences and is widely used for a recommender. The explicit method has a weakness of the accuracy to forecast as well as the sparsity of user-item matrix because partial rating on items causes missing value<sup>4,5</sup> value. The explicit method uses a measure of likert with the five-point scale. In general, it is performed in four steps as follows.

**Step 1:** To define and calculate the weighted of similarity with new users and neighbors.

**Step 2:** To predict a preference of New user for particular item, it is determine how many neighbors with high similarity and how many people by which criterion you will select.

**Step 3:** New users' preference predicts a value of preference for items which have not been input on the basis of preference for item of neighbors with similar preference.

**Step 4:** To evaluate the result of collaborative filtering with preference of item which has not input a preference of new users and predicted preference by proper evaluation criterion.

The system needs to execute the task of preprocessing of clustering the category of genre and style using listener's profile.

### B. Bayesian Networks (BNs)

BN model is well known to machine learning, has been used for applications in various areas<sup>6</sup>. It regulates a item preference model using BNs<sup>7</sup>. The problem in music recommender is finding music pieces that a given user is likely to rate highly. It calculates the conditional probability for the target user and the candidate item to find music pieces with a positive rating. It makes the list of recommending music pieces in music database by using descending order of probability. The recommender can receive user feedback for final purchase behavior and periodically, the system updates the parameters of the item preference. BNs model using final purchased data using the Bayesian inference engine<sup>8</sup> as the decision of behavior of buying additional item to increase the precision of the recommender. In general, the system executes learning algorithm using EM(expectation maximization)<sup>9</sup> to find a locally optimal maximum-likelihood estimate of the parameters.

## II. PROPOSED WORK

The system presents music recommender system with weight based on music sites with most popular current musics across all genres and styles using learning listener's profile. It has 1,000 listeners who have listened or downloaded and It uses 500 music pieces from collected by each 5 online music sites, such as Melon, Billboard, Bugs Music, Soribada and Genie. It has 5 weights based on online music sites which listener preferred, with most popular current musics across all genres and styles using learning listener's profile. It generates the cluster of music data on online music sites to join listener profile on the analytical agent. It does

computing listener's preference of all categories with all genres and styles by each music site. The cluster is selected by demographic variable of login user and listener's propensity. After that, the system can scan the category with high probability in music category belonged to brand music pieces. It executes two task of preprocessing for clustering<sup>8</sup>; One is doing of clustering the category of genre and style of listener's music in order to reflect the preference of all categories with all genres and styles. The other is doing of clustering with neighborhood user-group by listeners' demographic variable, and music propensity for music recommender system using Bayesian learning. As a matter of course, the system uses the task of clustering of the category of genre and style of listener's music in order to reflect the preference of most popular current musics. It can also consider the weight of listener's preferred music site with its popular music charts on trends for music recommender system.

**A. Clustering with Weight of Listener's Preferred Music Site**

In this section, the system suggests the music recommender system with weight based on music sites using learning listener's profile. It has 1,000 listeners in user profile, who have experienced to listen musics and have downloaded the mp3 music files from online music site and it uses 500 music pieces. There are related to a tight competition among online music sites. Thus, the system computes the weights by each music site listeners preferred, with all genres and styles. There are 5 rates by each online music sites which have its popular music charts on trends. The statistical result indicates taking the weight of possession of users by each listener's preferred music site as follows Figure 1. The music database created after suitable preprocessing for structure of content based listeners' music according to the list of category for music data, was grouped by and ordered by each music genre and music style based on big/medium/small category as seen in Table1. The big category is based on music sites with rank in as seen in Table1. The medium category is based on genre of music. The small category is based on style of music as seen in Table1.

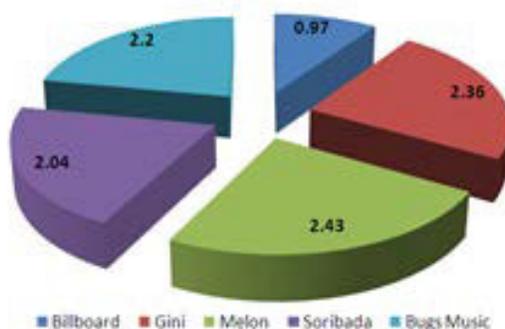


Figure 1: The Statistical Result of the Weight for Possession of Users by Each Listener's Preferred Music Site

Table 1: The List of Category for Music Data

<b>music sites with rank</b>	Melon realtime Top 100, Billboard Hot 100, Soribada popular chart, Gini Top 100, Bugs Daily Top 100
<b>genre</b>	R&B, Ballad, Dance, Folk, Electronica, Drama, Pop, Rock, Hip Hop, Ani, Pop, Country, Rap, Soul, Soft Pop
<b>Style</b>	R&B Ballad, 00' Ballad, Urban, Soft Pop/Rock, 00' Dance, Pop Rap, Medium, Folk Pop, Soft Dance, Electronica, Rap, Hip-Hop, Pop, R&B Dance, Pop Rock, Neo Soul, Urban, Club Dance, Punk Rock, Modern Folk, Dance Pop, Country Pop, Reggae, Korea TV Drama, Soul, CM Music, Alternative Pop, Indie, etc.

**B. The Task of Preprocessing for Music Recommender System with Weight based on Music Site**

The system creates the cluster of music data classified by music genre and music style through the preprocessing task. The system calculates listener's probability of preference of all categories of music genre and music style in clustering data which is selected by demographic variables. As a result of that, the system makes recommending list of musics with high probability in music category belonged to brand music pieces. It prepares two type of the task of preprocessing for music recommender system with efficiency based on music site. One is clustering of music genre and music style via Bayesian learning with weight based on music sites to adjust the result of listener's preference. The other is creating of clusters with neighborhood user-group by listeners' demographic variables. The system makes the clusters by each music genre and each

music style for music recommender system based on music site. It indicates the procedural steps for music recommender system as seen in Table 2. It applies the task of clustering of music genre and music style in the music sites in order to recommend the music through Bayesian learning with weight.

### III. EXPERIMENT & EVALUATION

#### A. Experimental Data for Evaluation

The system used 1,000 listeners in user profile, who had had the experience to listen songs and had downloaded the mp3 music files from online music sites with its popular music charts on trends in the music data reflected by most popular current music pieces across all genres and styles. They had listened or downloaded from online music sites and had used 500 music pieces. It needs to execute the task of clustering listener's preference with weight of online music sites using user profile. For doing that, It made the implementation for prototyping of music recommender system<sup>5</sup>. The experimental dataset for music recommender system was collected by each 5 online music sites for proving of the proposed. It has done the system implementation about prototyping for music recommender system. The system does the experiments in the same condition with dataset collected in online portal music sites such as Melon, Billboard, Bugs Music, Soribada and Gini. The 1<sup>st</sup> system is proposing system using learning through weight of listener's preferred music sites called by "proposal", the 2<sup>nd</sup> system is the other system called by "Other".

#### B. Experiment & Evaluation

There are two type of measurement for system performance evaluation. The first one is the MAE, which indicates difference between the predicted ratings and the actual ratings of users within the test set. It uses the expression over all data sets generated on purchased data.

$$MAE = \frac{\sum_{i=1}^N |\varepsilon_i|}{N} \quad (1)$$

N indicates the total number of predictions, ε indicate the error of the forecast and actual phase i indicates each prediction. At the first result for the system performance evaluation, the system uses the MAE in proposing system as comparing with the other system by each music sites such as Billboard, Genie, Melon, Soribada and Bugs Music as seen in Table 3.

Table 2: The Procedural Steps for Music Recomender System

<p><b>Step 1:</b> The login user scans user profile as listener's profile. The system recognizes demographic variable and music propensity in listener's profile.</p> <p><b>Step 2:</b> The cluster classified by demographic variable and music propensity of login user.</p> <p><b>Step 3:</b> The system scans listener's rate of preference of the categories for music sites in classified cluster.</p> <p><b>Step 4:</b> The system recommends music pieces using prior probability according to the preference in the cluster.</p> <p><b>Step 5:</b> The system recommends the music pieces according to the information of recommender which is applied by posterior probability through Bayesian learning, if a listener wanted to have any music pieces as additional request.</p> <p><b>Step 6:</b> The system makes listener's TOP-4 of music pieces in the list to recommend music pieces which is similar to music propensity of login user.</p>
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Table3: The Result of MAE by Music Sites

Music Site	Proposal	Other
Billboard	0.04	0.09
Genie	0.05	0.10
Melon	0.04	0.09
Soribada	0.05	0.09
Bugs Music	0.06	0.11

The average rate(0.04%) on music sites of Billboard for proposing system is lower than the average rate (0.09%) on MAE of the other system. The average rate(0.05%) on music sites of Genie for proposing system is lower than the average rate(0.10%) on MAE of the other system. The average rate(0.04%) on music sites of Melon for proposing system is lower than the average rate(0.09%) on MAE of the other system. The average rate(0.05%) on music sites of Soribada for proposing system is lower than the average rate(0.09%) on MAE of the other system. The average rate(0.06%) on music sites of Bugs Music for proposing system is lower than the average rate(0.11%) on MAE of the other system. Finally, the average rate(0.05%) for all of music sites is lower than the average rate (0.10%) on MAE of the other system. As a result, the system could have the music recommender system with weight based on music sites to be able to recommend the music pieces. The second evaluation is the metrics of evaluation for music recommender system for proposing system as comparing with the other system in clusters. For performance evaluation of the system, the system uses the metrics most widely used for recommender system using learning data set and testing data set. The metrics of evaluation for music recommender system in our system was used in the field of information retrieval commonly<sup>10</sup>. It presents the evaluation metrics for recommendation system as seen in Table 4. The numbers of cluster (C1~C5) have finished grouping the music sites based on music data. At the result of cluster, although the recall for proposing system was a little higher (0.02%) than the recall for the existing system but the precision for proposing system are higher (0.19%) than the precision for the other system. The F-measure for proposing system are higher (0.15%) than the F-measure for the other system. Finally, proposing system is improved better performance than the othersystem. Our proposing system with weight based on music sites is higher 19% in precision, higher 15% in F-measure even if it is a little higher 2% in recall than the other system. It shows the screen of music recommending site on a smart phone as follows Figure 2. As a result, It could have the music recommender system based on music sites using learning listener's profile to be able to recommend the music pieces with efficiency. Proposing system is improvement performance than the othersystem.

Table 4: The Result of Precision, Recall, F-Measurement for Recommending rate by Each Cluster

Category	Proposal			Other		
	Precision	Recall	F-measure	Precision	Recall	F-measure
C1	0.65	0.54	0.59	0.37	0.60	0.39
C2	0.45	0.60	0.47	0.16	0.39	0.21
C3	0.32	0.30	0.31	0.11	0.36	0.20
C4	0.16	0.31	0.21	0.19	0.39	0.22
C5	0.37	0.50	0.40	0.17	0.43	0.22



Figure 2: The Screen of Music Recommending Site

#### IV. CONCLUSION

These days, listeners can access various music databases through the Internet to find favorite musical pieces by using retrieval system. Along with the spread of digital music, the development of music source and recent growth in the digital music industry, the demands for music recommender are increasing. There are related to a tight competition among online music sites. Recently, they continue to discuss improvements for fairer digital music services. The cause of the distortions in the digital music market caused by the recommended music function is lack of reasonable level of recommender system. In the field of music recommender, it becomes quite challenging to get the reference or meaning out of some song or music<sup>11</sup>. Today it does, indeed, have recommender system it is crucial elements in a competitive e-commerce application<sup>12</sup>. This study presented a music recommender system based on music sites using learning listener's profile. It carried out experiments with dataset of collecting from online music sites to evaluate its performance. It made experimental report with some of results. In this music market environment, it is meaningful to present a reasonable music recommender system based on music sites using learning listener's profile. We're hoping that through future study it will eventually be able to reflect the personal sensitivity state according to the time zone, weather and season.

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## Identifying the Relationship between SNS Service Quality and Usage Intention: Comparison Analysis in Between United States and S. Korea

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### Abstract ---

**Objectives:** Most prior studies relevant to SNS have been in SNS motives and SNS effects and also have targeted at users in a single country. Thus, the purpose of our paper is to find out the relationship among SNS service quality, users' satisfaction, and intention to use in S. Korea and United States and then to compare differences in findings between two countries.

**Methods/Statistical Analysis:** Literature reviews on prior studies and empirical analyses through the surveys on SNS users have been implemented to achieve the research objectives. The paper set four SNS service qualities as independent variables, user satisfaction as an intervening variable, and user intention as a dependent variable. The paper, then, set a research model and hypotheses in order to verify the relationship among these variables.

**Findings:** The result of empirical analysis utilizing structural equation modeling based on the surveys on SNS users in S. Korea and the United States showed that, overall, only the information quality and relationship quality significantly impacted on users' satisfaction. The users' satisfaction also had significant influence on the intention of SNS usage overall. Only the relationship quality indicated the significantly different impact on users' satisfaction in two countries by the comparison analyses on the SNS users in two countries. Relationships between other variables were analyzed to have no difference between two countries. The study has reconfirmed the previous research's results. On the other hand, this article, dissimilar to other previous studies, demonstrated that different service quality factors may influence differently on users' satisfaction in other countries by the comparative analyses in between two countries.

**Improvements:** This study presented an implication that global companies should establish their SNS marketing strategy differently according to the result of the study reflecting that different SNS service quality influences differently in other countries.

**Keywords:** SNS, Service Quality, Users' Satisfaction, Usage Intention, Cross-Cultural Study.

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## **I. INTRODUCTION**

Recently, the use of SNS is rapidly increasing due to the spreading of smart phones, the usage of SNS is also growing explosively. The importance of SNS plays an important role in the marketing field. The existing researches tested on SNS in various academic fields have been actively carried out according to the trend of expanding SNS usage. A lot of previous researches that have examined SNS in the context of user motivation<sup>1</sup>, types of SNS<sup>2</sup>, effect of SNS<sup>3,4,5,6</sup>, and the analysis theory in social network<sup>7,8</sup>. Even though previous researches tended to justify users motivation, diffusion, and SNS adoption, these studies have some limitations in cross-cultural perspective. There are many studies on how different culture influences on consumer behavior differently in many business and marketing researches<sup>9</sup>. The people's selective behavior may vary by the cultural background although many different digital information services offered by on-line community such as SNSs can be used without limitation of physical, time, and spatial constraints.

The purposes of our research are (1) to investigate the relationship between SNS service quality and intention among the data about SNS usage collected in two countries, (2) to reveal the different trait in behavioral satisfaction and intention in SNSs between the users in the United States and S. Korea through a comparison analysis, and (3) to suggest the implications of marketing strategy.

### **A. SNS Service Quality**

Service quality offers a way of achieving success among competing services<sup>10</sup>. The preceding studies have examined in the context of behavioral perspective, such as user satisfaction, behavioral intention to use, commitment, and word-of-mouth(WOM) for SNS.

Ko et al. classified the SNS service quality into three factors such as service quality, information quality, emotion quality, and system quality. They also identified that quality dimensions effect usage intention, satisfaction was the mediating variable<sup>11</sup>. Previous studies in the tourism marketing field found the personalization of the SNS services could be an important factor and subdivided service quality into three (Park et al.).

Lee and Nam found that all the practical and empirical quality dimensions significantly effects satisfaction<sup>12</sup>.

A lot of studies on service quality identified practical aspects<sup>13</sup>, but there were few researches evaluate both practical and empirical aspectscomprehensively<sup>14</sup>. Therefore, our research verifies SNS quality comprehensively considering both practical and empirical qualities. Based on a comprehensive previous literature review, this article developed its SNS service quality dimensions. The research sub-dimension is based on the study of Parasuraman et al.<sup>15</sup>, and furthermore the inter face quality was obtained Kim et al.<sup>16</sup>,the convenience of use is Dabholkar et al.<sup>10</sup>, and information quality Fan and Kim's study<sup>17</sup>.Service quality was corresponds to the Ko et al.<sup>11</sup> and interface quality was based on Fan et al.'s study.

### **B. Users' Satisfaction**

Once the service has been used, outcomes are compared against expectancies. Satisfaction is defined as a post-consumption evaluation that a chosen alternative at least meets or exceeds as an expectation. In most of the studies, the customers' satisfaction is emphasized as an important factor in post-consumption behavior, the reason it that satisfaction influences positive future behavioral intention. Accordingly, the customers' who have experienced satisfaction contribute to the profit of the company and affects the behavioral intentions such as WOM effect<sup>17</sup>. In the tourism field SNS study of Park et al.<sup>18</sup>, it was verified that information quality and system quality affected customers' satisfaction. Kim andHwang's<sup>19</sup>study verified that service quality and information quality had a significant effect on satisfaction.

### **C. SNS Usage Intention**

Intent refers to the intention of a consumer to purchase a product or use a service, and in the field of marketing, a verbal intention that a consumer represents for a specific behavior<sup>20</sup>. Accordingly, the users who satisfied with SNS service will have behavioral intentions such as WOM and reuse. Kim andHwang<sup>19</sup>identified that SNS service quality affected customers' satisfaction and re-use intention. In the tourism SNS study of Park et al. also found that customers' satisfaction influenced re-use intention<sup>18</sup>.

## II. RESEARCH MODEL AND HYPOTHESES

The following study model was established based on the results of the preceding literature review.

### A. Research Model

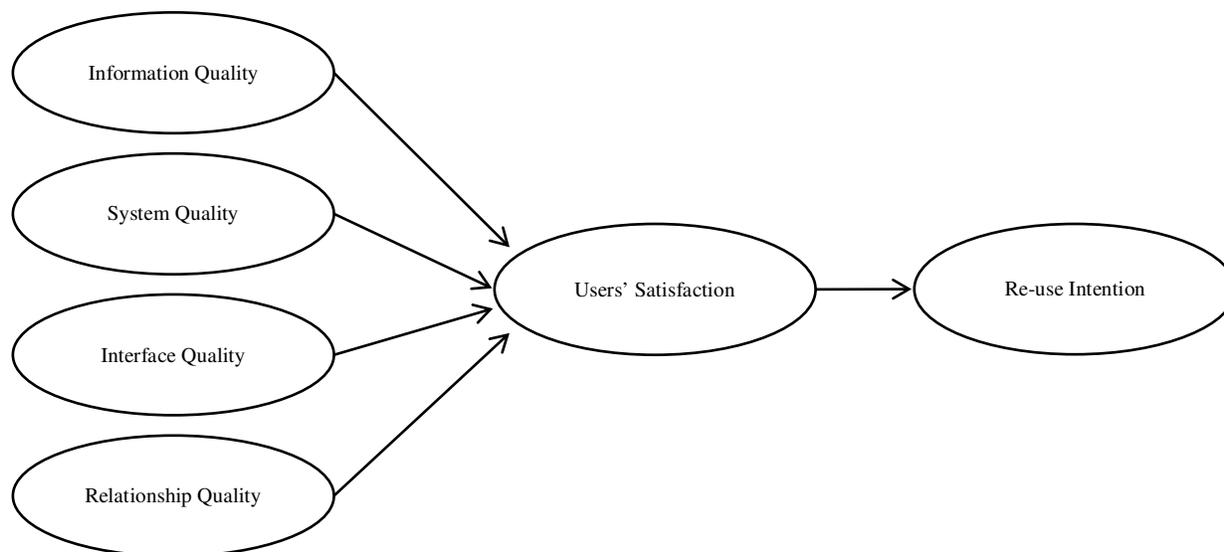


Figure 1: Research Model

### B. Research Hypothesis

H 1: SNS quality will positively influence users' satisfaction.

H 1-1. Information quality will positively influence users' satisfaction.

H 1-2. System quality will positively affect users' satisfaction.

H 1-3. Interface quality will positively influence users' satisfaction.

H 1-4. Relationship quality will positively influence users' satisfaction.

H2: Users' satisfaction will positively affect users' usage intention.

H3: SNS quality, users' satisfaction on SNS quality, and users' SNS usage intention in between United States and S. Korea will have significant difference.

## III. RESULTS

### A. General Demographic Profile

The sample consisted of 299 Korean and 271 USA SNS user. For both the Korean and the USA groups, 124 (41.5%) of the Korean respondents and 198 (73.1%) of the USA consumers showed that they have been using SNSs more than 3 years.

### B. Reliability and Validity Tests

Reliability and validity tests are summarized in Table 1. The CFA model provided good fits to the data. The  $\chi^2$  of the measurement models was 736.121 for the Korean sample, 578.818 for the USA sample, and 876.614 for the total sample with 260 degree of freedom. While the  $\chi^2$  was significant, it is known to be highly sensitive to sample sizes, and the ratio of the  $\chi^2/df$  were 2.831 (Korea), 2.226 (USA), and 3.372 (total) which is less than the cutoff point of 5. Additionally, the other indices also showed highly acceptable results (i.e., RMSEA < 0.08, etc.). As shown in Table 2, the results provided support for the uni-dimensionality of the scales.

For Cronbach's  $\alpha$  values for the data from Korea, USA, and combined total samples, the  $\alpha$  ranged from .752 to .909 for Korea and .725 to .889 for USA and .772 to .918 for the total samples respectively.

Table 1: Factor Loading Using CFA

Dimensions	Items	Korean sample			USA sample			Total sample		
		factor loading	t-value	Cronbach's $\alpha$	factor loading	t-value	Cronbach's $\alpha$	factor loading	t-value	Cronbach's $\alpha$
Information Quality	IQ 1	.677	-	0.725	0.694	-	0.772	0.661	-	0.752
	IQ 2	.708	9.660		0.645	9.274		0.647	12.655	
	IQ 3	.554	7.980		0.659	9.444		0.648	12.666	
	IQ4	.594	8.464		0.709	10.057		0.675	13.079	
System Quality	SQ 1	.765	-	0.832	0.690	-	0.814	0.717	-	0.815
	SQ 2	.760	12.534		0.746	10.767		0.776	16.632	
	SQ 3	.773	12.738		0.723	10.492		0.769	16.508	
	SQ4	.692	11.412		0.734	10.628		0.642	13.967	
Interface Quality	ITQ 1	.623	-	0.802	0.637	-	0.816	0.641	-	0.824
	ITQ 2	.680	9.071		0.729	9.569		0.740	14.077	
	ITQ 3	.685	9.114		0.683	9.118		0.697	13.481	
	ITQ 4	.755	9.673		0.658	8.861		0.713	13.716	
	ITQ 5	.597	8.251		0.718	9.464		0.686	13.324	
Relationship Quality	RQ 1	.790	-	0.889	0.760	-	0.912	0.797	-	0.909
	RQ 2	.808	14.618		0.862	14.157		.851	21.842	
	RQ 3	.795	15.024		0.891	16.982		.830	23.968	
	RQ4	.791	14.731		0.815	17.818		.816	23.811	
	RQ 5	.739	13.469		0.793	15.033		.798	21.880	
Satisfaction	SF 1	.794	-	0.858	0.898	-	0.918	.850	-	0.900
	SF 2	.764	13.944		0.887	21.747		.859	26.028	
	SF 3	.809	14.941		0.907	22.912		.868	26.972	
	SF4	.735	13.313		0.762	16.082		.755	21.469	
SNS-usage Intention	SUI 1	.757	-	0.845	0.806	-	0.832	.794	-	0.851
	SUI 2	.860	14.404		0.797	14.101		.840	21.392	
	SUI 3	.802	13.590		0.767	13.452		.798	20.176	

Total :  $\chi^2=876.614$  (df=260,p=0.000),  $\chi^2/df=3.372$ , GFI=.883, AGFI=.896, PGFI=.706, NFI=.901, IFI=.928, TLI=.916, CFI=.928, RMSEA=.065

**C. Hypotheses Testing**

The hypothesis test results are presented Table 2. The  $\chi^2$  value was  $\chi^2=920.109$ , (df=264, p=0.000,  $\chi^2/df=3.485$ ), GFI=.877, AGFI=.849, PGFI=.712, NFI=.896, IFI=.923, TLI=.912, CFI=.923, RMSEA=.066, indicated the initial theoretical model was somewhat acceptable.

Table 2: Testing Hypothesis 1-5 Coefficients for Total Sample

Proposed Model Paths	Standardized parameter estimate	t-value	Supported
H1 : Information Quality → Satisfaction	<b>0.261***</b>	<b>4.629</b>	<b>Supported</b>
H2 : System Quality → Satisfaction	0.091	1.716	Rejected
H3 : Interface Quality → Satisfaction	0.027	0.634	Rejected
H4 : Relationship Quality → Satisfaction	<b>0.626***</b>	<b>13.455</b>	<b>Supported</b>
H5 : Satisfaction → SNS-usage Intention	<b>0.854***</b>	<b>19.184</b>	<b>Supported</b>

$\chi^2=920.109$ , (df=264, p=0.000,  $\chi^2/df=3.485$ ), GFI = .877, AGFI = .849, PGFI = .712, NFI = .896, IFI = .923, TLI = .912, CFI = .923, RMSEA = .066

Three of the 5Hypotheses were supported and two were rejected. As summarized in Table 2, Information quality has significant impact on satisfaction ( $\beta = 0.261$ ,  $p < 0.01$ ), and thus, Hypothesis 1-1 was supported.

Relationship quality significantly influence satisfaction( $\beta = 0.626, p < 0.01$ ). Therefore, H 1-4 was also supported. On the other side, System quality and Interface quality were not significant impact on satisfaction( $\beta = 0.091, p > .05$ ;  $\beta = 0.027, p > 0.05$ ). So H1-2 and H1-3 were rejected. In sum, the structural model confirmed the casual relationship between SNS Information System factors and satisfaction. This result was also consistent with the studies of Szymanski and Fan et al. (2013) and it confirmed that Web site service quality positively related with customer satisfaction.

The result demonstrated satisfaction had a significant impact on relationship intention ( $\beta = 0.854, p < 0.01$ ), and thus Hypothesis 5 is supported as well.

Table 3: The Results of Cross-Cultural Analysis in the case of SNS

Proposed Model Paths	Korea		USA		$\Delta\chi^2$	
	Standardized parameter estimate	t-value	Standardized parameter estimate	t-value		
Information Quality → Satisfaction	0.360***	4.689	0.218**	2.175	0.161	K=U
System Quality → Satisfaction	0.140**	2.193	0.062	0.555	0.126	K=U
Interface Quality → Satisfaction	0.002	0.974	0.026	0.703	0.101	K=U
Relationship Quality → Satisfaction	0.546***	8.506	0.656***	9.485	3.897**	K<U
Satisfaction → SNS-usage Intention	0.783***	11.119	0.863***	14.456	0.001	K=U
$\chi^2 = 1362.706$ ; $df = 528$ , $\chi^2/df = 2.581$ , $GFI = .832$ , $AGFI = .793$ , $PGFI = .676$ , $NFI = .845$ , $IFI = .899$ , $TLI = .884$ , $CFI = .898$ ; $RMSEA = .053$						
** $p < 0.05$ ; *** $p < 0.01$ ; K: Korea, U: USA						

As shown in Table 3, the  $\chi^2$  difference ( $\Delta\chi^2$ ) which was more than 3.84 ( $df = 1$ ), significantly identified at a 5 % level that a different effect exists for the Information quality, Interface quality and System quality, Relationship quality variables in relation to satisfaction and SNS-usage Intention in the case of S. Korea versus United States SNS sites. However, interestingly, Information quality had a greater impact satisfaction in the case of Korea consumers ( $\beta = 0.360, p < 0.01$ ) than United States consumers ( $\beta = 0.218, p < 0.05$ ). And there was no significant difference in the relationship of Information quality and satisfaction between United States and S. Korea consumers. At the same time, it is found that there is no difference in the relationship of System quality and satisfaction, Interface quality and satisfaction between United States and S. Korea consumers. Specifically, relationship quality had a greater impact on satisfaction, in the case of United States consumers ( $\beta = 0.656, p < 0.01$ ) than S. Korean consumers ( $\beta = 0.546, p < 0.01$ ). Finally it is found that there was no difference in the relationship of Satisfaction and SNS-usage Intention between United States and S. Korea consumers. Based on these findings, Hypothesis 3 is partially supported. These findings implied that there was a conflict in the context of S. Korea versus United States SNS sites.

#### IV. CONCLUSION

This study has verified that the relationship between service quality and behavioral intention to use in S. Korea and United States and then to compare differences in findings between two countries. The results reconfirmed the previous research's results on the relationship. On the other hand, our paper, dissimilar to other previous studies, demonstrated that different service quality factors may influence differently on users' satisfaction in other countries by the comparative analyses in between two countries.

The results of this study presented an implication that global companies should establish their SNS marketing strategy differently according to the result of the study reflecting that different SNS service quality influences differently in other countries.

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## The Quality of Accounting Information and Investment Efficiency of IPO Firms in Korea

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### Abstract---

**Objectives:** This study examines empirically the effect of accounting information quality on the investment efficiency of initial public offerings (IPO) firms in Korea.

**Methods:** The performance adjusted discretionary accruals is used as a proxy for accounting information quality. The sample consists of 2,368 firm-years that went public on the Korea Composite Stock Price Index (KOSPI) and the Korea Securities Dealers Automated Quotations (KOSDAQ) between 2006 and 2014. We test our hypothesis by regressing the investment efficiency in year  $t+1$  on the measure of accounting information quality in year  $t$  around IPO.

**Findings:** Cross-sectional regression results show that discretionary accruals in the IPO year is significantly increased, but after the IPO, discretionary accruals and the scale of investment are significantly decreased. Investment efficiency in the year immediately after the IPO is more increased by higher quality accounting information, but in the year prior to the IPO, there is no connection between investment efficiency and accounting information quality.

**Applications:** These empirical results show economic effect of accounting information quality about investment efficiency before and after IPO, which turns out to notify the importance of accounting information quality.

**Keywords---** Accounting Information Quality, Information Asymmetry, Discretionary Accruals, Investment Efficiency, IPO Firms.

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## I. INTRODUCTION

Preceding studies propose that higher quality accounting information can improve investment efficiency- the reduction of over-investment or under-investment- by alleviating information asymmetries that bring about economic problems such as adverse selection and moral hazard<sup>1</sup>. And this relation between accounting information quality and investment efficiency is increasing in bank loan and decreasing in minimizing earnings for tax purpose<sup>2</sup>. In other word, this relation can be seriously influenced by accounting information's environment<sup>3</sup>, and then, we use the IPO as firms' critical factor to affect this relation. IPO pricing heavily depends on accounting information, but there is generally little disclosed accounting information about IPO firms, just high information asymmetries between the issuer and the investors. Therefore, in order to achieve higher offering price, managers have the stronger incentive to manipulate earnings in IPO process. Consequently, the accounting information quality becomes worse, and the role of accounting information quality on investment efficiency will be reduced around the IPO. On the other hand, listed firms have to observe the higher accounting standard by increased market and regulatory demand after the IPO<sup>4</sup>. And if they manage the earnings upward intentionally, they will encounter a risk of subsequent revelation, and lawsuit, because earnings inflation causes subsequent earnings deflation. Further, auditor designation revised rule for IPO firms that became effective in 2006 in Korea, make listed firms more difficult to inflate earnings. In sum, there are mixed possibilities about the earnings management around IPO. Therefore, it needs to be investigated whether accounting information quality measured by earnings quality affects investment efficiency of IPO firms.

## II. HYPOTHESIS DEVELOPMENT

There is no consistent result about earnings management of IPO firms. Some research assert that IPO firms manage earnings upward prior to IPO in order to satisfy the listing condition and to raise the new publication price by making use of high information asymmetry<sup>5,6</sup>. The other research show that IPO firms are likely to increase the earnings in year 0 and +1, not in year -1, in order to obtain high offer prices in seasoned offerings and in order to preserve stock price that follow IPO<sup>7,8</sup>. But auditor designation system for IPO and higher monitoring by interested parties, higher litigation risk after IPO, may make listed firms more difficult to manipulate earnings. <sup>9</sup>provides research result that IPO firms do not manage systematic earnings inflation and report accounting information more conservatively prior to the IPO. Their results are consistent with firms improving their accounting information quality prior to IPO, in order to meet the market demand for higher quality accounting information. It is not certain how earnings management shows up around IPO. <sup>10</sup> shows that IPO firms use less earnings management after the revision of auditor designation rule in Korea.

Meanwhile, there are reasons to think that accounting information quality will play a significant role in mitigate investment inefficiency. First, disclosed accounting information can improve the efficiency of investment by reducing liquidity risk, and information asymmetry<sup>11,12</sup>. Second, accounting information can aid corporate control system in precluding managers from exploiting wealth from outsiders (namely, internal stewardship function). Third, high-quality accounting information can help manager form more accurate estimations and become aware of better investment alternatives, thereby enhance the investment efficiency<sup>13</sup>. But it is not clear whether results from non IPO firms will hold for IPO firms, because accounting information quality may be lower for IPO firms.

Therefore, we need to investigate the association between accounting information quality and investment efficiency of IPO firms. This leads to our hypothesis.

***H: The accounting information quality is associated with investment efficiency of IPO firms.***

## III. RESEARCH MODEL

We use the performance adjusted discretionary model developed by<sup>14</sup>for measuring the accounting information quality. We calculate the following model by each industry that has at least 20 firm-year data:

$$TC_{it} = \alpha_0 \left( \frac{1}{Assets_{it-1}} \right) + \alpha_1 \Delta SALES_{it} + \alpha_2 \Delta REC_{it} + \alpha_3 PPP_{it} + \alpha_4 ROA_{it-1} + \varepsilon_{it} \quad (1)$$

$TC_{it}$  is total accruals, measured as net income minus the cash flow from operating (CFO), scaled by lagged total assets ( $Assets_{it-1}$ ).  $\Delta SALES_{it}$  is change in sales from year t-1 to year t, scaled by lagged total assets.  $\Delta REC_{it}$  is annual change in accounts receivable divided by lagged total assets, also.  $PPE_{it}$  is property, plant, and equipment for firm i at year t, scaled by lagged total assets.  $ROA_{it-1}$  is return on assets measured as net income divided by lagged total assets. We take the absolute value of residual(discretionary accruals) from the model(1) regression as a proxy for accounting information quality. We multiply the absolute value by -1 so that higher values represent higher accounting information quality.

We measure the investment efficiency by the investment model developed by<sup>2</sup>. First, we estimate model(2) cross-sectionally in each industry. The residuals of the model(2) imply deviations from predicted investments. We then take the absolute value of residuals as a proxy for investment inefficiency so that a higher value suggests more inefficiency of investment.

$$INV_{it} = \beta_0 + \beta_1 NEG_{it-1} + \beta_2 GSales_{it-1} + \beta_3 NEG * GSles_{it-1} + \varepsilon_{it} \quad (2)$$

$INV_{it}$  is the total investment which is calculated as the sum of increase in tangible assets and research and development expenditures, and scaled by lagged total assets.  $GSales_{it-1}$  is the annual sales growth.  $NEG_{it-1}$  is dummy variable that is one for negative annual sales growth rate, and zero otherwise.

We test our hypothesis by regressing the investment efficiency in year t+1 on the measure of accounting information quality in year t around IPO. We design the following empirical model according to priori researches.

$$InvIneff_{it} = \gamma_0 + \gamma_1 AIQ_{it-1} + \gamma_2 LnSize_{it-1} + \gamma_3 LnAge_{it-1} + \gamma_4 PPEA_{it-1} + \gamma_5 CashA_{it-1} + \gamma_6 Big4_{it-1} + \gamma_7 LnOPCY_{it-1} + \gamma_8 Industry + \varepsilon_{it} \quad (3)$$

$InvIneff$  is a dependent variable which stands for the investment inefficiency, and it is the absolute residual value of model(2).  $AIQ$  is a verification variable which stands for the accounting information quality.  $AIQ$  is the absolute residual of model(1), multiplied by -1. If  $AIQ$  mitigates investment inefficiency,  $\gamma_1$  is expected to be negative. Besides industry effect, we include firm size, firm age, cash level, auditor, and operating cycle as control variables.  $LnSize$  is the log of total assets.  $LnAge$  is the log of the firm age in years.  $PPEA$  is the ratio of property, plant, and equipment to total assets.  $CashA$  is the ratio of cash to assets.  $Big4$  is the dummy variable that takes one for big4 auditor, and zero otherwise.  $LnOPCY$  is the log of operating cycles.

#### IV. RESULTS

##### A. Descriptive Statistics

Table 1 shows the descriptive statistics about 2,368 firm-year samples. On average, firms make 7.9% more investment of lagged total assets than estimated scale of the investment, and investment inefficiency which is the absolute of investment difference between average investment and estimated investment is 11.6% of lagged total assets. Performance adjusted discretionary accruals approximately equals to 0, while accounting information quality ( $AIQ$ )'s mean takes about 1% of lagged total assets. The average size of sample firms is 68,799 million won, and at the time of empirical analysis, average firm's operating years is 10 years. Also, property, plant and equipment take 16.5%, cash holding rate is 10.6% of the total assets. Average operating cycle is 108 days, and the 69.1% of sample firms appear to be audited by Big 4.

Table 1: Descriptive Statistics

Variables	N	Mean	Standard deviation	25%	Median	75%
Investment difference	2,368	0.079	0.197	-0.011	0.035	0.122
Investment efficiency( $InvIneff$ )	2,368	0.116	0.178	0.022	0.060	0.139
Discretionary accruals	2,368	-0.010	0.240	-0.076	-0.012	0.053
$AIQ$	2,368	-0.102	0.218	-0.122	-0.065	-0.031
$LnSize$	2,368	24.954	1.242	24.134	24.736	25.484
$LnAge$	2,368	2.293	0.793	1.946	2.303	2.708
$PPEA$	2,368	0.165	0.140	0.059	0.131	0.233
$CashA$	2,368	0.106	0.104	0.032	0.076	0.147
$Big4$	2,358	0.691	0.462	0.000	1.000	1.000
$LnOPCY$	2,273	4.682	0.724	4.306	4.730	5.117

Table 2 indicates the change of earnings management, accounting information quality, and investment efficiency around IPO. Assuming the IPO year as t=0, this table shows the mean value and difference of them before and after 2 years of IPO. Panel A shows the result of whole sample firms. The investment scale is increased on t=0, but it is reduced, investment efficiency is increased after t=0(t=+1 ~ +2). The discretionary accruals are significantly increased on t=0, the other way, it is significantly reduced at t=+1. It means that the accounting information quality is significantly improved after the IPO year. Panel B shows the value of each sample group which is separated into firms listed in KOSPI (KOSPI firms) and firms listed in KOSDAQ (KOSDAQ firms). KOSDAQ is a secondary stock market and consists of relatively smaller, younger, higher growth and technology-oriented firms than KOSPI in Korea. The investment efficiency and accounting information quality of KOSDAQ firms around IPO is similar to the result of total sample. But there is no change in the investment efficiency of KOSPI firms before and after the IPO. Therefore, the increase of investment efficiency in panel A is maybe because the tendency of over-investment in KOSDAQ firms is considerably decreased after the IPO year.

Table 2: Investment Efficiency and Accounting Information Quality around IPO

Panel A: all samples

Variables		Year listed on stock exchange (t = 0)							
		t = -2	t = -1	t = 0	t = +1	t = +2	t = -2 ~ -1	t = +1 ~ +2	
Investment difference	mean	0.095	0.095	0.115	0.062	0.041		0.095	0.052
	difference		0.000	0.020	-0.052***	-0.021**			-0.043***
Investment Inefficiency	mean	0.142	0.139	0.134	0.100	0.079		0.140	0.090
	difference		-0.003	-0.005	-0.034***	-0.021***			-0.051***
Discretionary accruals	mean	-0.036	-0.032	0.040	-0.014	-0.011		-0.034	-0.012
	difference		0.005	0.072***	-0.054***	0.003			0.022**
AIQ	mean	-0.136	-0.111	-0.117	-0.082	-0.075		-0.123	-0.079
	difference		0.025	-0.006	0.036***	0.007			0.044***
N		390	458	447	532	541		848	1,073

Panel B: firms listed on KOSPI and KOSDAQ

Variables		Firms Listed on KOSPI (N=518)					Firms Listed on KOSDAQ (N=1,850)				
		Year listed on stock exchange(t = 0)					Year listed on stock exchange(t = 0)				
		t = -2	t = -1	t = 0	t = +1	t = +2	t = -2	t = -1	t = 0	t = +1	t = +2
Investment difference	mean	0.016	0.033	0.054	0.021	0.045	0.114	0.109	0.128	<b>0.077</b>	<b>0.039</b>
	Difference		0.017	0.021	-0.033	0.024		-0.005	0.019	-0.051**	-0.037**
Investment Inefficiency	mean	0.074	0.074	0.079	0.084	0.076	0.158	0.153	0.146	<b>0.106</b>	<b>0.080</b>
	difference		0.000	0.005	0.005	-0.008		-0.005	-0.007	-0.040**	-0.026**
Discretionary accruals	mean	-0.047	-0.050	<b>0.084</b>	<b>0.005</b>	0.000	-0.034	-0.028	<b>0.031</b>	<b>-0.020</b>	-0.015
	difference		-0.003	<b>0.134*</b>	-0.079*	-0.005		0.006	<b>0.059**</b>	-0.051**	0.006
AIQ	mean	-0.086	-0.118	-0.145	<b>-0.075</b>	-0.067	-0.148	-0.110	-0.111	<b>-0.084</b>	-0.078
	difference		-0.032	-0.026	<b>0.070*</b>	0.008		0.039	-0.002	<b>0.027**</b>	0.006
N		75	83	80	137	143	315	375	367	395	398

\*, \*\* and \*\*\* denote to be significant at the level of 1%, 5% and 10% respectively (two-tailed tests).

Difference is calculated by deducting the mean of former time from current mean. Investment difference is the residual value of model(2), and investment inefficiency is the absolute of investment difference. AIQ is the absolute value of discretionary accruals, multiplied by -1

**B. The Relation between Accounting Information Quality and Investment Efficiency Around IPO**

Regression analysis has carried out for recognizing the relevance between accounting information quality and investment efficiency, as shown on Table 3. Above all, Panel A indicates the result of regression analysis for total sample. The regression coefficient of AIQ which is a variable representing accounting information quality, shows significant (-) value after IPO (t=+1 ~ +2). Therefore, this results signify that high quality accounting information leads firms' investment efficiency to become higher as well. Thus, the hypothesis is adopted for directly after IPO. Furthermore, as tangible asset is of great importance, investment efficiency becomes higher, while other control variables could not draw significant result. Panel B shows the result of regression analysis for KOSPI firms, while Panel C bespeaks the result of KOSDAQ firms. KOSDAQ firms' regression analysis turned out to be similar to the whole sample data analysis. However, KOSPI firms showed negative influence of accounting information quality on investment efficiency only after 2 years of IPO (t=+2). On the whole, accounting information quality and investment efficiency rarely showed significant relevance in KOSPI firms. As mentioned, this results is because KOSPI firms' investment efficiency remains the same before and after IPO, therefore, KOSPI firms' investment efficiency is barely influenced by accounting information quality.

Table 3: Coefficient of Cross-Sectional Regression Results (Defendant Variable=InvIneff)

Panel A: regression analysis on total samples

Variables	Year listed on stock exchange(t= 0)									
	t=-2 ~ -1		t=0		t=+1		t=+2		t=+1 ~ +2	
	Coeff.	T-value.	Coeff.	T-value.	Coeff.	T-value.	Coeff.	T-value.	Coeff.	T-value.
Intercept	0.691	3.997	0.437	1.798	0.114	0.691	0.007	0.057	0.061	0.608
AIQ	-0.011	-0.417	0.001	0.017	-0.199	-3.090***	-0.243	-3.483***	-0.223	-4.781***
LnSize	-0.023	-3.492***	-0.010	-1.114	-0.002	-0.327	0.000	-0.024	-0.001	-0.260
LnAge	-0.018	-1.508	-0.033	-2.183**	-0.007	-1.122	0.008	1.412	-0.001	-0.249
PPEA	0.260	5.055***	0.157	2.180**	0.198	3.950***	0.167	4.460***	0.183	5.855***
CashA	0.033	0.434	-0.074	-0.927	-0.080	-1.124	-0.058	-1.020	-0.064	-1.399
Big4	0.012	0.660	-0.008	-0.402	-0.016	-1.168	0.011	1.128	-0.001	-0.159
LnOPCY	0.000	-0.023	0.009	0.688	0.004	0.464	0.006	0.894	0.005	0.919
N.	806		431		505		521		1,026	
F-value	5.732***		2.218**		3.851***		5.671***		8.382***	

Panel B: regression analysis on firms listed on KOSPI

Variables	Year listed on stock exchange(t= 0)									
	t=-2 ~ -1		t=0		t=+1		t=+2		t=+1 ~ +2	
	Coeff.	T-value.	Coeff.	T-value.	Coeff.	T-value.	Coeff.	T-value.	Coeff.	T-value.
Intercept	-0.194	-0.604	0.502	1.220	0.028	0.071	-0.134	-0.473	-0.034	-0.141
AIQ	-0.144	-1.111	0.011	0.258	0.095	0.501	-0.592	-3.236***	-0.175	-1.359
LnSize	-0.002	-0.224	-0.016	-1.062	-0.003	-0.188	0.005	0.457	0.001	0.164
LnAge	0.009	0.523	-0.020	-0.850	-0.007	-0.666	0.018	1.770*	0.003	0.353
PPEA	0.343	3.810***	0.151	1.156	0.211	1.484	0.147	1.417	0.186	2.137**
CashA	-0.008	-0.046	-0.064	-0.306	0.052	0.236	-0.107	-0.568	-0.014	-0.098
Big4	0.033	0.901	0.007	0.142	0.006	0.143	0.000	0.013	0.007	0.261
LnOPCY	0.035	2.043	0.007	0.297	0.023	0.942	0.005	0.292	0.009	0.650
N.	153		76		128		135		263	
F-value	2.704***		0.519		0.480		2.346**		1.221	

Panel C: regression analysis on firms listed on KOSDAQ

Variables	Year listed on stock exchange(t= 0)									
	t=-2 ~ -1		t=0		t=+1		t=+2		t=+1 ~ +2	
	Coeff.	T-value.	Coeff.	T-value.	Coeff.	T-value.	Coeff.	T-value.	Coeff.	T-value.
Intercept	0.742	2.452	-0.067	-0.161	0.012	0.048	0.112	0.625	0.078	0.506
AIQ	-0.007	-0.259	-0.028	-0.491	-0.268	-4.125***	-0.120	-1.714*	-0.229	-4.879***
LnSize	-0.021	-1.764*	0.010	0.636	0.003	0.330	-0.003	-0.413	0.000	-0.086
LnAge	-0.023	-1.561	-0.035	-1.873*	-0.009	-0.975	-0.004	-0.580	-0.007	-1.213
PPEA	0.225	3.722***	0.148	1.739	0.188	3.704***	0.163	4.290***	0.175	5.508***
CashA	0.035	0.418	-0.067	-0.762	-0.091	-1.296	-0.060	-1.095	-0.076	-1.717
Big4	0.008	0.379	-0.014	-0.577	-0.020	-1.484	0.012	1.212	-0.003	-0.414
LnOPCY	-0.011	-0.823	0.011	0.681	0.002	0.168	0.006	0.842	0.004	0.663
N.	653		355		377		386		763	
F-value	3.005***		1.339		4.897***		4.220***		8.505***	

\*, \*\* and \*\*\* denote to be significant at the level of 1%, 5% and 10% respectively (two-tailed t tests).

## V. CONCLUSION

The accounting information quality before and after IPO could turn out in diverse ways according to firm's information environment. Recently, regarding revision of assigned auditor system in Korea, prior research shows that accounting information quality of firm listed on stock market is higher after IPO. This study also shows that discretionary accruals have significantly increased in the year of IPO, while significantly diminished after the IPO. Therefore, accounting information quality seems to uplift right after IPO. Meanwhile, firms go public as one of investments funding methods. Firms with high growth potential would relatively invest excessively, and inefficiently manage the fund raised by listing stock. Therefore, we examine the investment efficiency before and after IPO and how the investment efficiency is affected by the accounting information quality. In this study, we empirically studied whether high accounting information quality raise the investment efficiency before and after IPO. We use the performance adjusted discretionary accruals as a proxy variable of accounting information quality. Also, we estimate the scale of investment with growth opportunity function, and the variables of firm size, firm age, the ratio of tangible assets, the cash holding ratio, the type of auditing firm, operating cycle are including in research model as control variables. As a result of regression analysis, companies- especially KOSDAQ firms- decreased excessive investment after IPO, and better quality of accounting information after IPO helped firms to achieve higher investment efficiency. These empirical results show economic effect of accounting information quality about investment efficiency before and after IPO, which turns out to notify the importance of accounting information quality.

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## An Estimation of Knowledge Production Function by Industry in Korea

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### Abstract---

**Background/Objectives:** Korea may be in the trap of low potential economic growth without a new economic growth strategy. We examined that how much R&D investment in Korea has an effect on patent.

**Methods/Statistical Analysis:** We estimate the knowledge production function for 28 industries in Korea using pooled OLS, fixed effect model and random effect model with panel data. The knowledge production function is a function between research and development (R&D) investment and knowledge creation. Knowledge creation is measured in terms of patent application.

**Findings:** We found that the R&D investments have played a very important role in increasing patent applications. The elasticity of patent applications with respect to R&D investment is 0.672, implying that a 1% increase in R&D investments will result in a 0.672% increase in patent applications. It means that R&D investment shows decreasing return to scale (DRTS) and that attribute of R&D investment is due to the imitateness.

**Improvements/Applications:** The higher the capital-labor ratio, the higher the productivity of R&D investment. These implies that R&D investment increases patent and thus it helps the economy grow in Korea.

**Keywords---** Knowledge Production Function, R&D Investment, Patent, Panel Data Analysis.

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## I. INTRODUCTION

Korea may be in the trap of low potential economic growth without a new economic growth strategy enhancing the total productivity of the economy as a whole. It will be necessary for Korea to develop scientific and technological innovations and accumulate knowledge and human capital to keep sustainable growth. Korea must increase R&D investments as well as the efficiency of R&D investments to keep sustainable growth. We had better understand the channel of economic effects of R&D investments on the total factor productivity.

The channel of economic effects of R&D investments on total factor productivity may be decomposed into several stages. In the first stage, an increase in R&D investments increases patent applications. In the second stage, an increase in patent applications increases knowledge stock. In the third stage, an increase in knowledge stock enhances the total factor productivity.

The purpose of this study is to estimate the knowledge production function both for all industries and for eight groups of industry in Korea. The knowledge production function is a function between R&D investment and knowledge creation. Knowledge creation is measured in terms of patent applications.

## II. LITERATURE SURVEY

There are many works on R&D and patents: Schumpeter<sup>13</sup>, Nordhaus<sup>11</sup>, Pakes and Griliches<sup>12</sup>, Bound and Cummins<sup>4</sup>, Hall, Griliches and Hausman<sup>5</sup>, Griliches<sup>9</sup>, Kortum<sup>7</sup>, Lanjouw and Schankerman<sup>8</sup>, Beneito<sup>3</sup>, Baudry and Dumont<sup>2</sup> to name a few.

There are some views in which patents should be considered the intermediate output from R&D because R&D serves to increase the gross domestic product (GDP). Hall, Griliches and Hausman<sup>5</sup> estimated a patent production function and found there exists a constant returns to scale (CRTS) between R&D investment and the number of patents.

On the contrary, Bound and Cummins<sup>4</sup> estimated a patent production function but found that there is a decreasing returns to scale (DRTS) between R&D investment and the number of patents.

Reference Baudry and Dumont<sup>2</sup> asserted that R&D investment, acting as the driving force for the innovation, finally raises the growth rate, regardless of the growth stage. This implies that creation of knowledge and innovative activities is required to achieve economic growth successively. In this respect, it is said that the reason the European Union has a slower economy than the United States results from a deficiency in the innovative components.

Also, there are many studies testing the hypothesis that R&D investment increases patent enrollments, for example, Griliches<sup>9</sup>, Kortum<sup>7</sup>, Lanjouw and Schankerman<sup>8</sup>, and so on. Pakes and Griliches<sup>12</sup> found a strong correlation between a firm's R&D investment and a patent enrollment using firm data. Hall, Griliches and Hausman<sup>5</sup> showed that there is a time lag between R&D investment and patent enrollment.

## III. TRENDS OF R&D INVESTMENTS AND PATENTS

The raw patent data that we had was classified on the basis of 35 technologies; we reclassified it into 28 industries using technology and industry codes. We created the data set because we don't have the industry-specific raw data for patents. Thus we made a useful data set from the annual data released from Minister of Patents.

We used the patent applications in 28 industries and industry-specific data. The problem was that Korean patent applications differ in industry classification. We tried to match the industry classification of R&D investments to that of patent applications.

We analyzed the firm data from 1983 to 2010. The total applications are estimated to be 998,609.

<Figure 1> shows the trends of both R&D investment and patent applications in Korea. The trends of two variables dropped drastically right after the second half of 1997 and the global financial crisis of 2008. It strikingly shows that patents respond to economic fluctuations stronger than R&D investments.

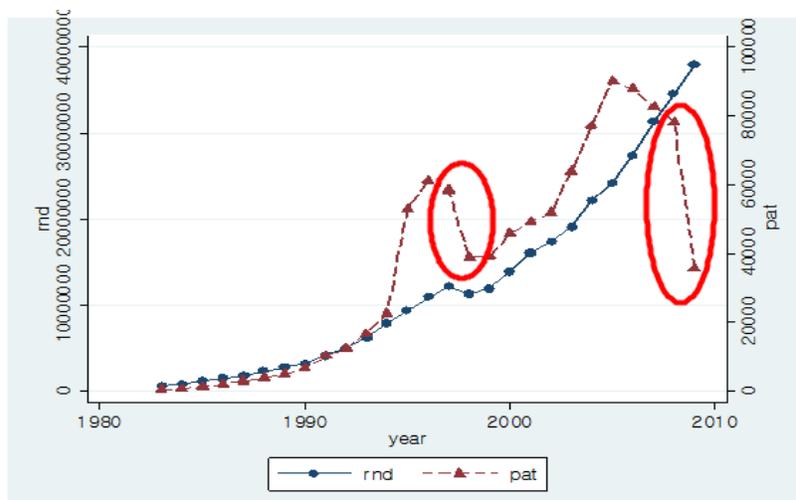


Figure 1: Trends of Total R&D Investments and Patent Applications

<Figure 2> and <Figure 3> show the trends of both R&D investments and patent applications for industries 1–12 and 13–27, respectively, in Korea. As in <Figure 1>, the trends of the two variables dropped drastically right after the second half of 1997 and the global financial crisis of 2008. It shows that patents respond to economic fluctuations more strongly than R&D investment.

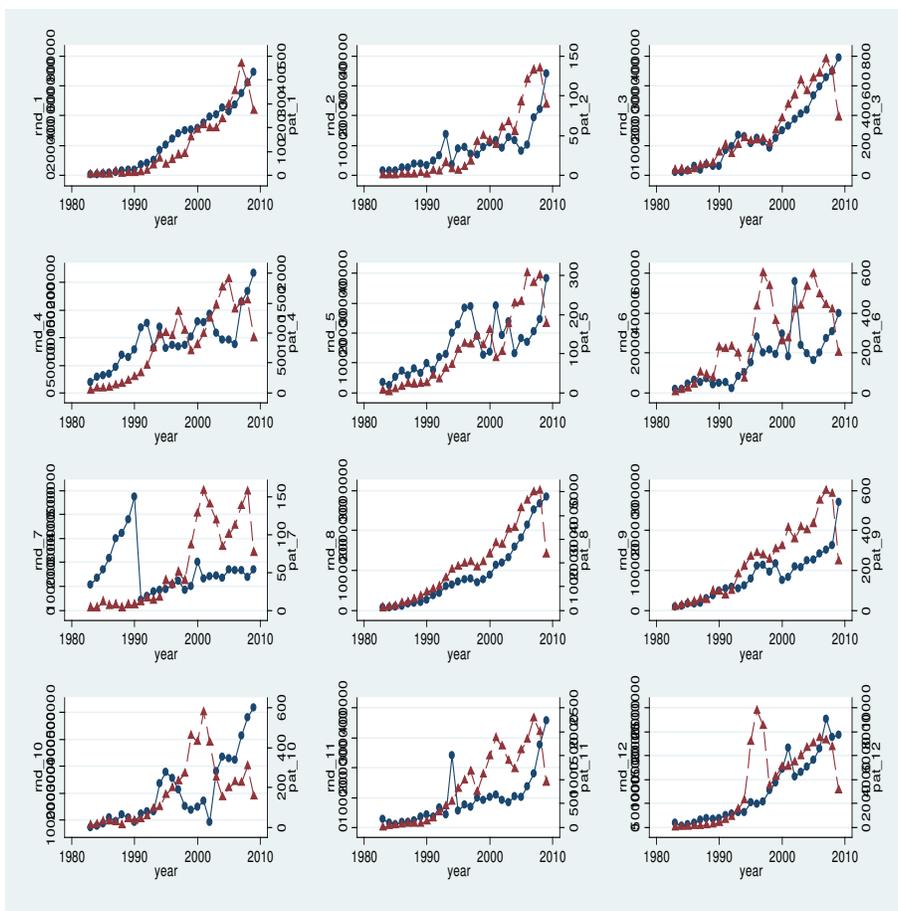


Figure 2: Trends of Total R&D Investments and Patent Applications for Industry 1 through Industry 12: 1983–2009

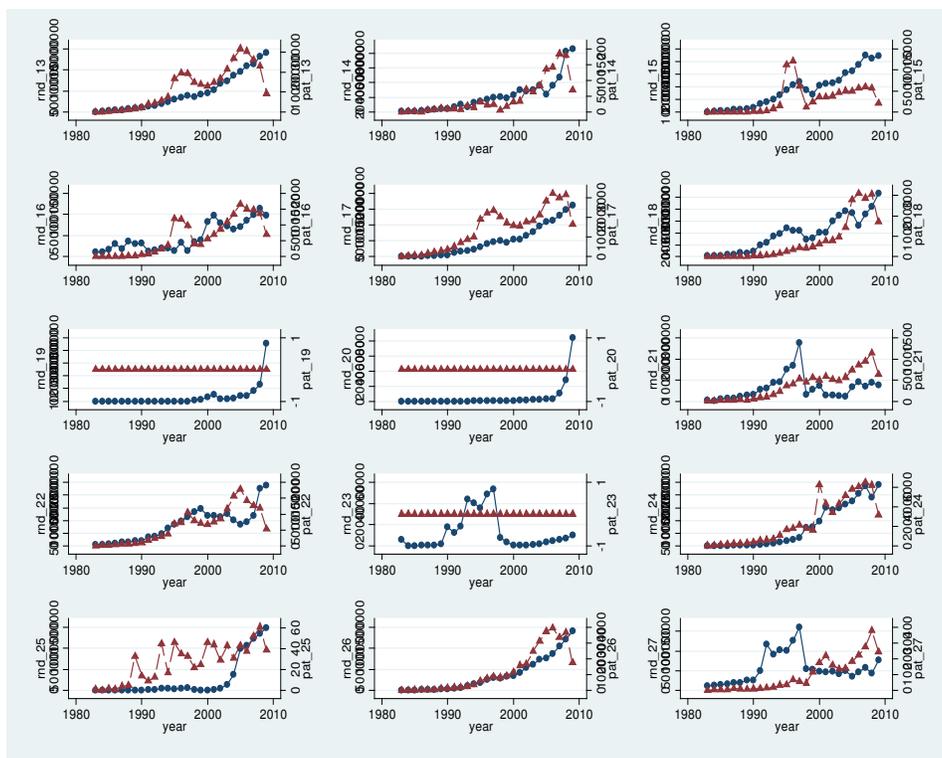


Figure 3: Trends of Total R&D Investments and Patent Applications for Industry 13 through Industry 27: 1983–2009

#### IV. ESTIMATION RESULTS OF KNOWLEDGE PRODUCTION FUNCTION

The knowledge production function that we used is based on the R&D-based growth model shown in equation (1).

$$\dot{A} = \delta(R\&D)^\lambda A^\phi \tag{1}$$

We may derive the following estimation in equation (2)

$$\log PAT = \alpha + \beta \log RD + \gamma_1 TREND + \gamma_2 \log \frac{K}{L} + u \tag{2}$$

where, PAT equals the number of the patent applications, RD equals R&D investment, TREND equals the time trend, and  $\frac{K}{L}$  equals capital equipment ratio.

The estimation result for whole sample is shown in <Table 1>.

Table 1: Estimation Results of Knowledge Production Function: All Industries

Dependent Variable: <i>log PAT</i>			
	Pooled	FE	RE
<i>log RD</i>	0.871868*** (26.085)	0.672171*** (20.319)	0.693975*** (21.232)
$\log \frac{K}{L}$	0.178013** (2.698)	1.234081*** (15.828)	1.156222*** (15.120)
Constant	5.541907*** (55.861)	6.839315*** (67.421)	6.732157*** (25.574)
<i>R</i> <sup>2</sup>	0.563978	0.747426	0.747060
log likelihood	-1.15e+03	-7.46e+02	
<i>N</i>	642	642	642

Note: t-values in parentheses.

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01.

The first column shows the estimation results for OLS(Ordinary least squares), the second column shows the ones for the fixed effect model, and the third column shows the ones for the random effect model. By the Hausman test, the fixed effect model is the best one with a 1% significance level.

The coefficient of the R&D investment variable is 0.672, implying that an R&D investment increase of 1% increases patent applications by 0.67%. When we compare our elasticities with the previous ones, ours is a little bit higher than 0.37~0.52 in Hausman, Hall and Griliches<sup>6</sup> 0.208 in Abdih and Joutz<sup>1</sup>, and 0.1~0.6 in Kortum<sup>7</sup>.

The fact that R&D investment productivity is less than 1 means that R&D investment shows DRTS and that attribute of R&D investment is due to an imitateness.

The coefficient of the capital labor ratio  $\text{per}(\frac{K}{L})$  has a positive value with a high statistical significance. It implies that, other things being equal, the higher the capital equipment ratio, the greater the number of patents and the higher the productivity of R&D investment.

We classified 28 industries into eight industry groups in Table 2. The estimation results for the eight industry groups are as follows.

Table 3 shows the estimation results for eight industrial groups. The optimal model varies in industry in Table 3.

In <Table 3> the coefficient of variable *logRD* represents the elasticity of the patent applications with respect to R&D investments. The highest elasticity of the patent applications is 0.889 in industry group VIII. The reason the elasticity is bigger than the other sectors might be that the R&D sector belongs to one of these industries.

Table 2: Bank of Korea 28 Industry classifications resort to 8 Industry groups

Industry Group	Bank of Korea 28 Industry classifications
Group I	1.Agriculture, forestry and fishing, 2.Mining and quarrying, 3.Food, beverages and tobacco products
Group II	4.Textile and apparel, 5.Wood and paper products, 6.Printing and reproduction of recorded media
Group III	7.Petroleum and coal products, 8.Chemicals, drugs and medicines, 9.Non-metallic mineral products
Group IV	10.Basic metal products, 11.Fabricated metal products except machinery and furniture, 12.General machinery and equipment, 15.Transportation equipment
Group V	13.Electronic and electrical equipment, 14.Precision instruments, 16.Furniture and other manufactured products
Group VI	17.Electricity, gas, steam and water supply, 18.Construction
Group VII	21.Transportation, 22.Communications and broadcasting
Group VIII	24.Real estate and business services, 25.Public administration and defense, 26.Education, health and social work, 27.Other services, 28.Dummy sectors

The second highest elasticity is 0.869 for industry group VII. The third highest elasticity is 0.846 for industry group V. The fourth highest elasticity is 0.738 for industry group IV. The least elasticity of patent applications with respect to R&D investment belongs to industry group I.

## V. CONCLUSION

Findings from knowledge production function estimations are as follows. It turns out that the R&D investments have played a very important role in increasing patent applications. The elasticity of patent applications with respect to R&D investment is 0.672, implying that a 1% increase in R&D investments will increase patent applications by 0.672%. Our estimate of the elasticity of patent applications with respect to R&D investment is a little bit higher than previous studies such as Hausman, Hall and Griliches<sup>6</sup> (0.37~0.52) and Kortum<sup>7</sup> (0.1~0.6).

We found that the higher the capital-labor ratio, the higher the productivity of R&D investment. We estimated the elasticity of patent applications with respect to R&D investments for eight industrial groups considering the panel data characteristics.

## ACKNOWLEDGMENT

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# The Relationships of Person-Organization Fit and Person-Job Fit with Work Attitudes: A Moderating Effect of Person-Supervisor Fit

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## Abstract---

**Objectives:** This study examined unique relationships of person-organization (PO) fit and person-job (PJ) fit with work attitudes and the moderating effects of person-supervisor (PS) fit on their relationships.

**Methods/Statistical Analysis:** Survey data were obtained from a sample of 199 individuals with different job types and ranks in various companies across several industries, including pharmacy, furniture, hospital, electronic equipment, etc. located in Korea. Hierarchical multiple regression analyses were conducted to test three hypotheses. The significance of the incremental variance explained by the addition of the main effect variables or interaction terms were examined in the hierarchical multiple regression analyses.

**Findings:** The results show that individuals are able to distinguish between the perceptions of PO\_fit and PJ\_fit and that both PO\_fit and PJ\_fit had unique impacts on organizational commitment (OC) and job satisfaction (JS). The results supported hypothesis 1. However, the results did not support the hypothesis 2 that PO\_fit is more likely to relate to OC and PJ\_fit is more likely to relate to JS. Regarding hypothesis 3, this study found the effects of PO\_fit x PS\_fit and PJ\_fit x PS\_fit on OC. PO\_fit or PJ\_fit was shown to have stronger relationship with OC when individuals perceive high PS\_fit than when individuals perceive low PS\_fit. The results indicate that individuals' perceptions of fit with their supervisors can be important moderators strengthening or weakening the relationships between PO\_fit or PJ\_fit perceptions and OC. The moderating effects of PS\_fit were not found in relationships of PO\_fit or PJ\_fit with JS.

**Improvements/Applications:** The simultaneous examination of three levels of fit perceptions helped provide a more comprehensive picture about the influence of PE\_fit perceptions. The implications of the results were further discussed.

**Keywords---** Person-Organization Fit, Person-Job Fit, Person-Supervisor Fit, Organizational Commitment, Job Satisfaction.

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## I. INTRODUCTION

The notion of person-environment (PE) fit has been of great interest to researchers in the field of organization and human resource management. PE\_fit is generally defined as the degree of match between individuals and work environment. PE\_fit has shown to relate to work attitudes including organizational commitment (OC) and job satisfaction (JS)<sup>1</sup>. OC and JS have been considered to be important attitude factors to be managed for organizations<sup>2</sup>. The relationship between PE\_fit and work attitudes can be explained by several theories such as interaction theory<sup>3</sup>, the theory of work-adjustment (TWA)<sup>4</sup>, and the attraction-selection-attrition (ASA)<sup>5</sup>. According to the interaction theory, an individual's behavior is affected by the interaction between the individual and the environment<sup>6</sup>. TWA argues that individuals can satisfy their needs from organizational reinforcers and organizational requirements can be fulfilled by the abilities of the individuals<sup>4</sup>. Accordingly, individuals and organizations impose requirements of one another and the correspondence between individuals and organizations results in JS<sup>1</sup>. Similarly, an ASA theory argues that people are attracted to, are chosen by, and remain in organizations that share similar values and preferences with them<sup>7</sup>. Thus, individuals who share the same values with their work environment tend to have positive work attitudes. As an overarching construct, PE\_fit subsumes multiple levels of fit: person-vocation(PV) fit, person-organization(PO) fit, person-job(PJ) fit, person-group(PG) fit, and person-supervisor fit(PS) fit<sup>8</sup>. There is a substantial amount of research focusing on a single level of PE\_fit. However, increasing requests have been made to examine the effects of multiple levels of PE\_fit in a single study since each level of fit has been considered as a distinct construct<sup>9</sup>.

In line with these requests, several studies have been conducted to investigate how multiple levels of PE\_fit are related to each other and to work attitudes. For example, Reference<sup>10</sup> examined PO\_fit and PJ\_fit perceptions of job seekers and new comers and found that PO\_fit perceptions were better predictors of job choice intention, OC and JS. Reference<sup>11</sup> examined job seekers' PO\_fit and PJ\_fit perceptions and showed that both fit perceptions related to JS and intention to quit. Reference<sup>12</sup> also examined PO\_fit and PJ\_fit perceptions of job applicants and showed that PJ\_fit perception was a better predictor of hiring recommendation. Reference<sup>13</sup> investigated PO\_fit and PJ\_fit perceptions of employees in a large trucking company and demonstrated that each level of fit perception explained unique variance of JS and that PO\_fit perception was a better predictor of turnover intention. In addition, Reference<sup>14</sup> examined three different types of fit including PO\_fit, demands-abilities (DA) fit, and needs-supplies (NS) fit. DA\_fit and NS\_fit are two different perspectives of conceptualizing PJ\_fit. DA\_fit indicates the degree of the individuals' possession of abilities required by an organization. NS\_fit is the match between individuals' needs or rewards received as an exchange for their contributions to a job. They showed that the three types of fit perceptions were distinctive constructs. Similarly, Reference<sup>15</sup> reported that the three types of fit perceptions have unique relationships with satisfaction with the internship. However, all of these studies focused only on two levels of PE\_fit, PO\_fit and PJ\_fit, and most of them were performed in selection context<sup>16</sup>. More studies need to examine more than two levels of PE\_fit at the same time in daily working context<sup>17</sup>. In addition, Reference<sup>14</sup> suggests that much of existing evidence on fit perceptions has difficulty in the interpretation because the measurement scales of fit perceptions differ among studies and contain different characteristic or content dimensions (e.g., values, personalities, goals, etc.) in them.

A fit perception should be measured without mixing different characteristics or content dimensions in the same scale for clear interpretation<sup>18</sup>.

The current study investigates three levels of PE\_fit perceptions; PO\_fit, PJ\_fit, and person-supervisor (PS) fit, in relations with OC and JS. PO\_fit and PJ\_fit has been the most extensively researched among the various level of PE\_fit<sup>8</sup>. Since PO\_fit and PJ\_fit perceptions are considered as distinct constructs which may differentially relate to various outcomes, two outcome variables corresponding to the levels of fit perceptions are included in this study.

One is OC as an organization-referent outcome and the other is JS as a job-referent outcome. Furthermore, this study explores the moderating effects of PS\_fit perceptions on the relationships of PO\_fit and PJ\_fit perceptions with OC and JS. It will help understand how different levels of fit affect each other within the broader framework of PE\_fit. Particularly, this study tries to combine multiple levels of fit in a more complex way rather than a simple additive way. It will help provide a more comprehensive framework where multiple levels of fit interplay.

## II. LITERATURE REVIEW AND HYPOTHESES BUILDING

### A. *PO\_Fit and PJ\_Fit Perceptions*

PO\_fit is generally defined as the compatibility between individuals and their organizations<sup>8</sup>. Although PO\_fit can be conceptualized in many different ways, the most common way of conceptualizing it is value congruence, indicating the similarity in values between individuals and organizations<sup>19</sup>. The concept of value congruence is grounded on the supplementary fit perspective, indicating the similarities between individual characteristics and organizational characteristics<sup>20</sup>. The ASA framework<sup>5</sup> provides a theoretical foundation for the relationships between PO\_fit and work attitudes. Individuals tend to be more attracted to organizations that they perceive as having similar values to them. Thus, individuals who do not share the same values with their organization tend to be less satisfied and less committed to their organization<sup>5</sup>. Furthermore, organizational environment can provide individuals with the opportunity to fulfill their needs, which, in turn, results in positive work attitudes<sup>21</sup>. When individuals' values match with the organizational culture, their needs are more likely to be fulfilled by the organization and the fulfillment increases OC and JS<sup>22</sup>. A substantial number of researches have reported that PO\_fit perceptions related to work attitudes such as OC and JS<sup>23</sup>. Meta-analysis by<sup>24</sup> and<sup>25</sup> also showed that PO\_fit perceptions had strong relationship with OC and JS. Based on the results of previous studies, it will be expected that the more individuals perceive values congruence with an organization, the more they experience commitment to the organization and satisfaction toward their jobs.

PJ\_fit is generally defined as compatibility between an individual's attributes and the job characteristics<sup>8</sup>. There are two ways of conceptualizing PJ\_fit; demands-abilities (DA) fit and needs-supplies (NS) fit. DA\_fit concerns the relationship between the demands of a job and the abilities of a job holder, and NS\_fit concerns the relationship between the needs of an individual and the supplies from a job<sup>26</sup>. Both of DA\_fit and NS\_fit are conceptualization of PJ\_fit based on a complementary fit perspective, which indicates the extent to which the individual and environment each provides what the other party requires<sup>8</sup>. DA\_fit is the most frequently used in the selection context<sup>27</sup>. In addition, most researches which examined unique relationships of PO\_fit and PJ\_fit with work attitudes used DA\_fit to measure PJ\_fit<sup>14</sup>. DA\_fit refers to the match between individuals' knowledge, skills and abilities (KSAs) with the requirements of their jobs<sup>12</sup>. Accordingly, DA\_fit can be perceived when an individual has KSAs to fulfill the demands of a job. Based on the TWA theory<sup>4</sup>, many researchers have used JS as the most proximal outcome of PJ\_fit. The TWA theory argues that the fit between individual and environmental characteristics yields increased JS<sup>14</sup>. Individuals who perceive high DA\_fit experience a high level of congruence between their KSAs and the demands of a job, which leads to the fulfillment of their needs<sup>28</sup>. Furthermore, high DA\_fit likely serves to embed individuals in their organizations, which increases their OC<sup>29</sup>. Accordingly, the better an individual fits with the demands of his or her job in terms of knowledge, skills, and abilities, the more the individual is likely to feel professionally and personally tied to an organization<sup>16</sup>. Reference<sup>26</sup> reported that the majority of research has found that PJ\_fit perception positively related to JS. The meta-analysis by<sup>25</sup> also showed that PJ\_fit perception had strong correlations with JS ( $\rho=0.56$ ) as well as OC ( $\rho=0.47$ ). Based on the results from previous studies, it will be expected that DA\_fit relates to JS and OC.

### B. *The Unique Relationships of PO\_Fit and PJ\_Fit Perceptions with Work Attitudes*

Each of PO\_fit and PJ\_fit perceptions has been reported to relate to OC and JS, as discussed above. However, it has been also argued that PO\_fit and PJ\_fit perceptions are distinct constructs and have unique impacts on OC and JS. PJ\_fit is considered relative to a specific job, not to the values of an organization. Similarly, PO\_fit is considered relative to an organization, not to a job. Accordingly, employees may possess the KSAs to fulfill the demands of the job, but these individuals may not share the values of an organization and vice versa<sup>13</sup>. Several studies examined PO\_fit and PJ\_fit perceptions simultaneously in a single study and verified their discriminant validity. Empirical evidence shows that PO\_fit and PJ\_fit perceptions are separate and distinct constructs, with a modest amount of overlap. For example, using the concept of DA\_fit, the correlation between PO\_fit and PJ\_fit was reported to be .35<sup>10</sup>, .72<sup>12</sup>, .18<sup>13</sup>, .28<sup>14</sup>, .28<sup>15</sup> and .46<sup>29</sup>. Furthermore, PO\_fit and PJ\_fit perceptions were found to have unique relationships with various outcomes, controlling for each other<sup>14</sup>. Based on the previous empirical evidence, the following hypothesis is derived.

Hypothesis 1: PO\_fit and PJ\_fit perceptions will have unique positive relationships with JS and OC.

Reference<sup>14</sup> argues that the perceptions of different levels of fit should differentially associated with outcomes if these perceptions are truly distinct. Since PO\_fit and PJ\_fit perceptions focus on different level of referents, their relative importance may differ depending on the outcomes with different targeting referents. For example, PJ\_fit perceptions are made relative to a job and PO\_fit perceptions are made relative to an organization. OC is an attitude about organizations or an organization-referent outcome and JS is an attitude specific to a job or a job-referent outcome. Accordingly, PO\_fit perception is more likely to relate to OC and PJ\_fit perception is more likely to relate to JS. The similar argument was made by<sup>8</sup>, suggesting that PO\_fit should more strongly relate to OC and PJ\_fit more to JS because of the difference in their levels of referents. Reference<sup>13</sup> showed that the perception of PO\_fit has a greater impact on organization-focused attitude of intent to quit than the perception of PJ\_fit. Meta-analysis by<sup>25</sup> also showed that JS was the most strongly related to PJ\_fit perceptions and OC was the most strongly correlated with PO\_fit perceptions. Based on the above argument, the following hypotheses are derived.

Hypothesis 2a: PO\_fit perception will have a stronger relationship with OC than PJ\_fit perception.

Hypothesis 2b: PJ\_fit perception will have a stronger relationship with JS than PO\_fit perception.

### **C. A moderating Effect of PS\_Fit Perceptions**

PS\_fit is defined as the similarity in characteristics, such as personality, values, and attitudes, between individuals and their supervisors<sup>30</sup>. Because supervisors are usually recognized by subordinates as the agents of an organization and because they control resources needed to perform jobs, they can be thought to be significant others for their subordinates<sup>31</sup>. Accordingly, supervisors will represent an important environment proximal to individuals and PS\_fit perceptions will be another key concept of PE\_fit relating to work attitudes. Individuals' perceptions of PS\_fit are reported to relate to their satisfaction with the job and organization<sup>32</sup>. However, the number of studies on PS\_fit is not only relatively small, but also almost no studies examine PS\_fit simultaneously with PO\_fit or PJ\_fit<sup>33</sup>. This study focuses on moderating effects of PS\_fit perceptions on the relationships between PO\_fit or PJ\_fit perceptions and work attitudes. First, PS\_fit perception can be a key determinant of the extent to which PO\_fit perception relates to work attitudes. When PS\_fit perception is low, the positive relationships between PO\_fit perception and work attitudes will become weaker. Because individuals tend to pay more attention to a low fit with their supervisor (as negative information) and to pay less attention to other level of fit such as PO\_fit for their evaluations of work attitudes<sup>34</sup>. On the other hand, the relationships between PO\_fit perception and work attitudes will become stronger when PS\_fit perception is high. Because the individuals tend to pay less attention to their fit with supervisors (as positive information) and pay more attention to other level of fit for their evaluations of work attitudes. Second, the same moderating effects of PS\_fit can be explained in the relationships between PJ\_fit and work attitudes. PS\_fit perception weakens or strengthens the relationships between PJ\_fit perception and work attitudes. When individuals perceive PS\_fit low, they are likely to pay less attention to their fit with jobs for the evaluations of their work attitudes. In contrast, when individuals perceive PS\_fit high, they are likely to pay more attention to their fit with jobs for the evaluations of their work attitudes. Based on these arguments<sup>34</sup>, the moderating effects of PS\_fit perceptions on the relationships between PO\_fit or PJ\_fit perceptions and work attitudes are hypothesized as follows.

Hypothesis 3a: The relationships between PO\_fit perception and organizational commitment or job satisfaction will be moderated by PS\_fit perception, such that the positive relationship between them will be stronger when PS\_fit perception is higher.

Hypothesis 3b: The relationships between PJ\_fit perception and organizational commitment or job satisfaction will be moderated by PS\_fit perception, such that the positive relationship between them will be stronger when PS\_fit perception is higher.

## **III. METHOD**

### **A. Sample**

Data were collected using questionnaires from employees working for various companies, including two pharmaceutical companies, a furniture company, a hospital, electronic or equipment companies, etc. located in Korea. A total of 203 questionnaires were distributed and 199 respondents completed questionnaires. Among a total sample of 199, 58.1% are males and 51.0% are married and 77.7% have an education level higher than university graduates. The respondents ranged in age from 20th to 50th, and in job rank from

bottom-level employees to senior managers with organization tenure ranging from 'less than 1 year' to 'more than 10 years'. The job types of the respondents are managers, office workers, sales workers, and so on. Of respondents' background variables, gender and age did not correlate with any of the variables in the hypotheses. The other background variables correlated with either fit perceptions or work attitudes. Accordingly, the background variables except for gender and age were controlled in regression analyses for hypotheses testing.

### **B. Measures**

The perceptions of PO\_fit, PJ\_fit, PS\_fit, OC, and JS all were measured using 5-point Likert-scale ranging "strongly disagree" to "strongly agree". Respondents were asked to indicate their level of agreement on each question item.

**Perceived PO\_fit.** Perceived PO\_fit in this study was conceptualized in terms of value congruence between individuals and organizations because it is the most frequently used dimension of PO\_fit<sup>19</sup>. Three items identified by<sup>14</sup> were employed to assess individuals' perceived PO\_fit. The question items included "The things that I value in life are very similar to the things that my organization values," "My personal values match my organization's values and culture," and "My organization's values and culture provide a good fit with the things that I value in life". The obtained alpha coefficient of this measure was .919.

**Perceived PJ\_fit.** We conceptualized PJ\_fit perception in terms of demands-abilities (DA) fit for this study. To measure DA\_fit perception, we used three items developed by<sup>13</sup>, which contain questions about fit with the job in terms of KSAs. The question items included "My abilities fit the demands of this job," "I have the right skills and abilities for doing this job," and "There is a good match between the requirements of this job and my skills". The obtained alpha coefficient of this measure was .871.

**Perceived PS\_fit.** PS\_fit perception in this study was conceptualized in terms of value congruence and attitude similarity between individuals and their supervisors. Individuals' value congruence with their supervisors was assessed using a 3-item scale revised by<sup>14</sup>. The question items included "My personal values match my supervisor's values and ideals," "The things that I value in life are similar to the things my supervisor values," and "My supervisor's values provide a good fit with the things I value". Perceived similarity between individuals and supervisors was measured with six items dealing with attitudes on family, money, career strategies, goals in life, education, and overall perspective. The factor analyses resulted in one-factor solution for all items about value congruence and attitude similarity. Thus, value congruence and attitude similarity were combined to form the measure of PJ\_fit perception. The obtained alpha coefficient of this measure was .900.

**OC.** A 9-item scale developed by<sup>17</sup> was used to measure OC. Sample items of this scale included "I am willing to put in a great deal of effort beyond that normally expected in order to help this organization be successful," "I talk up this organization to my friends as a great organization to work for," "I really care about the fate of this organization". The obtained alpha coefficient of the scale was .772.

**JS.** A 3-item scale developed by<sup>35</sup> was employed to measure general JS. The three items consisted with the following questions such as, "Generally speaking, I am very satisfied with this job," "I frequently think of quitting this job (reverse scored)," "I am generally satisfied with the kind of work I do in this job". The obtained alpha coefficient of the scale was .802.

### **C. Analysis Methods**

We conducted hierarchical multiple regression analyses to test our hypotheses. Following<sup>36</sup> approach, we examined the significance of the incremental variance explained by the addition of the main effect variables or interaction terms, along with the significance of the regression coefficients.

## **IV. RESULTS**

### **A. Factor Analyses and Descriptive Statistics**

We performed exploratory factor analyses, with principle component analysis and varimax-rotated solution. The first factor analysis extracted nine factors with 6 question items loaded the highest on the other factors than the expected factors. Based on this result, 1 question item in PJ\_fit perceptions and 5 question items in OC were removed and performed the second factor analysis. The result yielded a five-factor solution, explaining total 69.7% of the variance. The result of the second factor analysis is presented in Table 1.

Table 1: The Result of Factor Analysis

Variables	Contents of Factor				
	No.1	No.2	No.3	No.4	No.5
PO_fit	.200	.786	.329	.088	.157
	.259	.851	.212	.113	.146
	.241	.860	.188	.131	.178
PJ_fit	.064	.077	.103	.861	.192
	-.045	.068	.072	.869	.117
	.098	.127	.201	.807	.220
PS_fit	.758	.217	-.060	-.009	.272
	.793	.154	.065	.006	.262
	.838	.177	.048	-.019	.192
	.766	.035	.152	-.068	.029
	.834	.170	.113	.034	.028
	.656	-.138	.227	.155	.090
	.632	.134	.147	.105	-.240
	.672	.303	.020	.078	.065
Organization Commitment	.116	.127	.802	.076	.008
	.305	.152	.650	.146	.306
	.071	.143	.772	.111	.254
	.046	.213	.609	.108	.107
Job Satisfaction	.130	.156	.246	.350	.690
	.216	.124	.215	.106	.732
	.065	.203	.161	.303	.772
Eigen value	4.833	2.556	2.529	2.508	2.205
% of variance	23.014	12.171	12.042	11.943	10.502
Cumulative %	23.014	35.186	47.227	59.170	69.672

Basic statistics, including means and standard deviation, and correlations are summarized in Table 2. Cronbach  $\alpha$  for each measure was above .80, and all the correlations among the variables are significant in the expected direction. For example, the correlation between PO\_fit and PJ\_fit perceptions is .31 ( $p < .01$ ). PO\_fit perception has positive correlations with OC ( $r = .51, p < .01$ ) and JS ( $r = .45, p < .01$ ). PJ\_fit perception also has positive correlations with OC ( $r = .34, p < .01$ ) and JS ( $r = .49, p < .01$ ). PJ\_fit perception positively correlates with both PO\_fit ( $r = .45, p < .01$ ) and PJ\_fit ( $r = .15, p < .05$ ), although the relationship between PJ\_fit and PJ\_fit is relatively weak. PJ\_fit perception also has positive correlations with OC ( $r = .35, p < .01$ ) and JS ( $r = .34, p < .01$ ).

Table 2: Basic Statistics and Correlations

231		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	PO_fit	2.8928	.94739	0.919													
2	PJ_fit	3.5260	.71482	.308**	0.871												
3	PS_fit	2.8643	.74913	.454**	.150*	0.900											
4	Organization Commitment	3.0151	.80035	.511**	.341**	.345**	0.808										
5	Job Satisfaction	3.2138	.84686	.450**	.488**	.338**	.506**	0.802									
6	Marriage	.5101	.50117	-.076	.087	-.117	.060	-.100	-								
7	Education Level	2.8122	.60631	.117	.147*	-.021	.042	-.048	.170*	-							
8	Job rank	2.5678	1.48874	-.049	.155*	-.129	.145*	.003	.540**	.234**	-						
9	Tenure	3.1616	1.34585	-.120	.005	-.159*	.081	-.134	.505**	.217**	.676**	-					
10	Office worker	.4724	.50049	-.152*	-.171*	-.177*	-.005	-.051	-.110	-.130	-.084	.000	-				
11	Sales worker	.2764	.44834	.019	.159*	.076	.073	.088	.134	.118	.278**	.161*	-.585**	-			
12	*Industry 1	.4322	.49663	-.177*	-.117	-.103	-.020	-.091	.115	.013	.158*	.314**	.170*	.164*	-		
13	*Industry 2	.2010	.40176	.052	.023	.028	.081	.056	-.186**	.032	-.192**	-.267**	.078	-.030	-.438**	-	
14	*Industry 3	.1005	.30143	.115	.003	-.161*	-.111	-.131	-.007	.077	-.195**	-.065	-.316**	-.207**	-.292**	-.168*	-

Note 1) \*\* $P < .01$  \* $P < .05$ , Reliabilities (Cronbachs) of the scales appear on the diagonal

Note 2) Industry 1 indicates pharmaceutical, Industry 2 indicates furniture, and Industry 3 indicates hospital.

**B. Hypotheses 1 and 2**

Hypothesis 1 concerns the unique relationships of PO\_fit and PJ\_fit perceptions with OC and JS. To examine Hypothesis 1, we conducted hierarchical multiple regression analyses where we entered control variables into the first step, followed by main effect variables in the second step. The results are presented in Table 3.

Table 3: Regression Analyses for Hypotheses 1 & 2

<i>DV: Organization Commitment</i>									
								95% CI	
<i>Variables</i>	<i>R</i> <sup>2</sup>	<i>F</i>	$\Delta R^2$	$\Delta F$	<i>B</i>	$\beta$	<i>t</i>	<i>Lower</i>	<i>Upper</i>
<b>Step 1</b>	.041	.892	.041	.892					
(constant)					2.771		8.792***	2.149	3.393
Marriage					-.013	-.008	-.094	-.293	.266
Education					.009	.007	.087	-.189	.206
Job rank					.080	.149	1.360	-.036	.197
Tenure					.008	.014	.131	-.117	.133
Office					-.014	-.008	-.077	-.361	.334
Sales					.031	.017	.160	-.350	.412
*Industry 1					-.055	-.034	-.361	-.354	.245
*Industry 2					.171	.086	.971	-.176	.517
*Industry 3					-.201	-.076	-.804	-.695	.292
<b>Step 2</b>	.361	9.447***	.320	46.001***					
(constant)					.883		2.507*	.188	1.579
Marriage					.026	.016	.223	-.204	.256
Education					-.104	-.079	-1.251	-.268	.060
Job rank					.046	.085	.933	-.051	.142
Tenure					.061	.102	1.166	-.042	.164
Office					.122	.076	.842	-.164	.409
Sales					.034	.019	.216	-.279	.348
*Industry 1					.092	.057	.732	-.156	.340
*Industry 2					.204	.103	1.414	-.081	.489
*Industry 3					-.213	-.081	-1.038	-.619	.192
<i>PO_fit</i>					.430	.509	7.935***	.323	.537
<i>PJ_fit</i>					.208	.186	2.887**	.066	.351
<i>DV: JS</i>									
								95% CI	
<i>Variables</i>	<i>R</i> <sup>2</sup>	<i>F</i>	$\Delta R^2$	$\Delta F$	<i>B</i>	$\beta$	<i>t</i>	<i>Lower</i>	<i>Upper</i>
<b>Step 1</b>	.067	1.485	.067	1.485					
(constant)					3.696		11.032***	3.035	4.357
Marriage					-.162	-.095	-1.092	-.455	.131
Education					-.030	-.021	-.276	-.240	.181
Job rank					.070	.122	1.128	-.052	.192
Tenure					-.100	-.158	-1.510	-.231	.031
Office					-.091	-.053	-.494	-.455	.273
Sales worker					.082	.043	.406	-.316	.480
*Industry 1					-.198	-.115	-1.245	-.513	.116
*Industry 2					-.116	-.055	-.631	-.478	.247
*Industry 3					-.473	-.169	-1.808	-.989	.043
<b>Step 2</b>	0.394	10.835***	.327	49.415***					
(constant)					1.163		3.074	.416	1.909
Marriage					-.137	-.080	-1.133	-.374	.101
Education					-.124	-.087	-1.425	-.296	.048
Job rank					.013	.022	.251	-.087	.113
Tenure					-.034	-.054	-.635	-.141	.072
Office					.033	.020	.222	-.263	.329
Sales worker					.042	.022	.257	-.281	.366
*Industry 1					-.052	-.030	-.400	-.308	.204
*Industry 2					-.076	-.036	-.507	-.369	.218
*Industry 3					-.476	-.170	-2.243*	-.894	-.057
<i>PO_fit</i>					.318	.354	5.688***	.208	.428
<i>PJ_fit</i>					.477	.389	6.266***	.327	.627

Note 1)\*\*\*P< .001 \*\*P< .01 \*P< .05

Note 2) Industry 1 is pharmaceutical, Industry 2 is furniture, and Industry 3 is hospital.

After controlling for background information in step 1, each of OC and JS was regressed on PO and PJ\_fit perceptions. The addition of PO and PJ\_fit perceptions at step 2 explained a significant amount of incremental variance in both OC ( $\Delta R^2 = .32, p < .001$ ) and JS ( $\Delta R^2 = .33, p < .001$ ). At step 2, each fit perception is found to have significant independent effect on OC as well as JS. After controlling for each other, PO\_fit perception affects OC ( $\beta = .51, p < .001$ ) and PJ\_fit perception affects OC ( $\beta = .19, p < .01$ ). Similarly, after controlling for each other, PO\_fit perception affects JS ( $\beta = .35, p < .001$ ) and PJ\_fit perception affects JS ( $\beta = .39, p < .001$ ). The results support Hypothesis 1. Hypothesis 2a predicts that PO\_fit perception after controlling for PJ\_fit perception will have a stronger relationship with OC than PJ\_fit perception will after controlling for PO\_fit perception. To test this hypothesis, we examined the 95% confidence intervals around regression weight on OC regression weights in addition to regression coefficients<sup>13</sup>. As seen at step 2 in Table 3, the regression coefficient between PO\_fit perception and OC ( $\beta = .51, p < .001$ ) is greater than the regression coefficient between PJ\_fit perception and OC ( $\beta = .19, p < .01$ ). However, the 95% confidence intervals of regression coefficient for PO\_fit overlap with those for PJ\_fit. Thus, hypothesis 2a is not supported. Similarly, hypothesis 2b predicts that PJ\_fit perception after controlling for PO\_fit perception will have a stronger relationship with JS than PO\_fit perception will after controlling for PJ\_fit perception. To test this hypothesis, we also examined the 95% confidence intervals around regression weights on JS<sup>13</sup>. As seen at step 2 in Table 3, the regression coefficient between PJ\_fit perception and JS ( $\beta = .39, p < .001$ ) is not much different from the regression coefficient between PO\_fit perception and JS ( $\beta = .15, p < .01$ ). Furthermore, the confidence intervals of regression coefficients for PO\_fit and PJ\_fit perceptions overlap with each other. Thus, hypothesis 2b is not also supported.

### C. Hypotheses 3

Hypothesis 3a concerns the interaction effects of PO\_fit and PS\_fit perceptions on OC and JS. To test hypothesis 3a, we conducted hierarchical multiple regression analyses, where control variables were entered into the first step, followed by main effect variables in the second step, and an interaction term in the third step. The results are presented in Table 4.

Table 4: The Interaction Effects of PO\_fit x PS\_fit

		Organization Commitment				JS			
		$\beta$	t	$\Delta R^2$	$\Delta F$	$\beta$	t	$\Delta R^2$	$\Delta F$
Step 1				.041	.892			.067	1.485
	(constant)		8.792***				11.032***		
	Marriage	-.008	-.094			-.095	-1.092		
	Education	.007	.087			-.021	-.276		
	Job rank	.149	1.360			.122	1.128		
	Tenure	.014	.131			-.158	-1.510		
	Office	-.008	-.077			-.053	-.494		
	Sales	.017	.160			.043	.406		
	*Industry 1	-.034	-.361			-.115	-1.245		
	*Industry 2	.086	.971			-.055	-.631		
	*Industry 3	-.076	-.804			-.169	-1.808		
Step 2				.319	45.985***			.224	28.868***
	(constant)		2.843**			-.062	5.232***		
	Marriage	.030	.411			-.056	-.803		
	Education	-.050	-.793			.104	-.849		
	Job rank	.126	1.396			-.087	1.090		
	Tenure	.096	1.095			.017	-.946		
	Office	.078	.862			.039	.179		
	Sales	.016	.176			-.065	.417		
	*Industry 1	.033	.429			-.049	-.802		
	*Industry 2	.094	1.293			-.203	-.642		
	*Industry 3	-.112	-1.432			.382	-2.467		
	PO_fit	.478	7.030***			.188	5.342***		
	PS_fit	.196	2.883**				2.618*		
Step 3				.020	5.788*			.007	1.841
	(constant)		3.711***				4.518***		
	Marriage	.030	.420			-.061	-.803		
	Education	-.050	-.804			-.056	-.856		
	Job rank	.137	1.531			.110	1.158		
	Tenure	.100	1.156			-.085	-.923		
	Office	.096	1.072			.028	.294		
	Sales	.028	.313			.046	.494		
	*Industry 1	.034	.449			-.065	-.794		
	*Industry 2	.120	1.651			-.034	-.435		
	*Industry 3	-.086	-1.106			-.188	-2.262		
	PO_fit	.044	.231			.122	.600		
	PS_fit	-.149	-.942			-.020	-.118		
	PO_fit x PS_fit	.680	2.406*			.407	1.357		
	F		9.365***				6.443***		
	Total R <sup>2</sup>		.380				.298		

Note 1) \*\*\*P < .001 \*\*P < .01 \*P < .05

Note 2) Industry 1 is pharmaceutical, Industry 2 is furniture, and Industry 3 is hospital.

As seen in Table 4, an interaction term (PO\_fit x PS\_fit) entered at Step 3 explained a significant amount of the incremental variance in OC ( $\Delta R^2=.02$ ,  $p<.05$ ), but not in JS ( $\Delta R^2=.01$ , ns). A PO\_fit x PS\_fit on OC is not only significant but also positive ( $\beta=.68$ ,  $p<.05$ ) while the interaction term on JS is not significant ( $\beta=.41$ , ns). The PO\_fit x PS\_fit was graphed on OC, following the procedures suggested by<sup>37</sup>. This graph is depicted in Figure 1, which indicates that the relationship between PO\_fit perception and OC is stronger when the perception of PS\_fit are high than when PS\_fit perception is low. When individuals perceive PS\_fit high, those who perceive greater fit with their organizations report greater OC than those who fit the organizations less well. Thus, hypothesis 3a is supported for OC, but not for JS.

Table 5: The Interaction Effects of PJ\_fit x PS\_fit

		Organization Commitment				JS			
		$\beta$	<i>t</i>	$\Delta R^2$	$\Delta F$	$\beta$	<i>t</i>	$\Delta R^2$	$\Delta F$
<b>Step 1</b>				.041	.892			.067	1.485
	(constant)		8.792***				11.032***		
	Marriage	-.008	-.094			-.095	-1.092		
	Education	.007	.087			-.021	-.276		
	Job rank	.149	1.360			.122	1.128		
	Tenure	.014	.131			-.158	-1.510		
	Office	-.008	-.077			-.053	-.494		
	Sales	.017	.160			.043	.406		
	*Industry 1	-.034	-.361			-.115	-1.245		
	*Industry 2	.086	.971			-.055	-.631		
	*Industry 3	-.076	-.804			-.169	-1.808		
<b>Step 2</b>				.218	27.086***			.296	42.578***
	(constant)		1.278				1.850		
	Marriage	.006	.077			-.085	-1.171		
	Education	-.019	-.283			-.044	-.714		
	Job rank	.097	.991			.032	.354		
	Tenure	.097	1.030			-.054	-.613		
	Office	.046	.472			.002	.020		
	Sales	-.038	-.399			-.021	-.235		
	*Industry 1	.008	.100			-.064	-.830		
	*Industry 2	.089	1.136			-.046	-.638		
	*Industry 3	-.120	-1.430			-.203	-2.600*		
	PJ_fit	.280	4.177***			.448	7.254***		
	PS_fit	.360	5.395***			.290	4.680***		
<b>Step 3</b>				.019	4.855*			.000	.000
	(constant)		2.536*				.727		
	Marriage	.005	.065			-.085	-1.168		
	Education	-.023	-.350			-.044	-.710		
	Job rank	.107	1.102			.032	.352		
	Tenure	.095	1.012			-.054	-.611		
	Office	.064	.663			.002	.019		
	Sales	-.013	-.139			-.021	-.234		
	*Industry 1	-.009	-.112			-.064	-.824		
	*Industry 2	.095	1.223			-.046	-.636		
	*Industry 3	-.091	-1.085			-.203	-2.560		
	PJ_fit	-.214	-.914			.450	2.056		
	PS_fit	-.356	-1.073			.293	.925		
	PJ_fit x PS_fit	.935	2.203*			-.004	-.009		
	<b>F</b>	5.888***				8.663***			
	<b>Total R<sup>2</sup></b>	.279				.364			

Note 1)\*\*\*P< .001 \*\*P< .01 \*P< .05

Note 2) Industry 1 is pharmaceutical, Industry 2 is furniture, and Industry 3 is hospital.

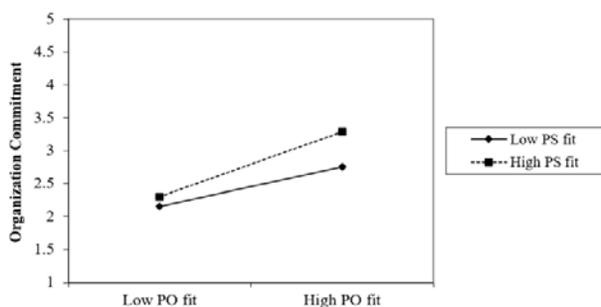


Figure 1: PO\_fit x PS\_fit Interaction Graph

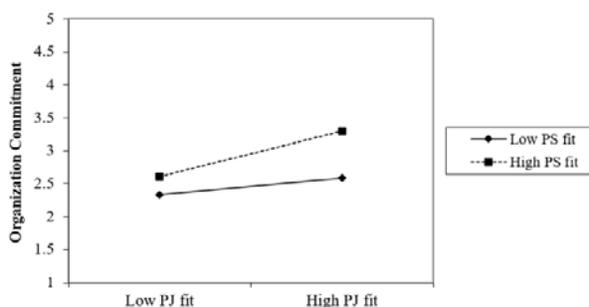


Figure 2: PJ\_fit x PS\_fit Interaction Graph

Hypothesis 3b concerns the interaction effects of PJ\_fit and PS\_fit perceptions on OC and JS. Again, hierarchical multiple regression analyses were conducted and the results are presented in Table 5. An interaction term (PJ\_fit x PS\_fit) entered at Step 3 explained a significant amount of the incremental variance in OC ( $\Delta R^2=.02$ ,  $p<.05$ ), but not in JS ( $\Delta R^2=.00$ , ns). A PJ\_fit x PS\_fit on OC is not only significant but also positive ( $\beta=.94$ ,  $p<.05$ ) while the interaction term on JS is not significant ( $\beta=-.00$ , ns). The PJ\_fit x PS\_fit is also graphed on OC. The result is almost same as the interaction of PO\_fit and PS\_fit. As shown in Figure 2, the relationship between PJ\_fit perception and OC is stronger when the perception of PS\_fit is high, and the relationship is weaker when PS perception is low. Thus, hypothesis 3b is also supported for OC, but not for JS.

## V. RESULTS

### A. Discussion

This study provides evidence that PO\_fit and PJ\_fit perceptions are distinct constructs and they interact with PJ\_fit perception to influence work attitude such as organizational commitment. By examining three levels of PE\_fit, including PO\_fit, PJ\_fit, and PS\_fit, this study helps extend our understanding of the concept of PE\_fit. Results of this study showed PO\_fit and PJ\_fit perceptions were correlated ( $r=.35$ ), with both measures having acceptable reliabilities ( $\alpha$  coefficients of PO\_fit and PJ\_fit were .92 and .87 respectively). This result is almost identical with those of the previous studies, which reported modest correlations<sup>29</sup>. Although correlated with each other, PO\_fit and PJ\_fit perceptions are argued to have unique relationships with OC and JS<sup>14</sup>. Results of this study supported the arguments, by showing that PO\_fit and PJ\_fit perceptions, controlling for each other, affected OC as well as JS. The results indicate that individuals are able to distinguish between the perceptions of PO\_fit and PJ\_fit and that each of the fit perceptions has unique or independent impacts on work attitudes. The improvement of an individual's perceptions of fit with his or her job and organization can additively affect his or her OC and JS. This study also examined the differential relationships of PO\_fit and PJ\_fit perceptions. It is argued that PO\_fit perceptions are more likely to relate to OC and PJ\_fit perceptions are more likely to relate to JS<sup>25</sup>. However, the results of this study showed no difference in the degree of impacts of each fit perceptions on OC and JS. Although not statistically significant, the regression coefficient between PO\_fit perception and OC was stronger than the regression coefficient between PJ\_fit perception and OC. This result is almost identical with that of a previous study<sup>13</sup>, reporting that PO\_fit perception had a greater impact on organization-focused attitude of intent to quit than PJ\_fit perceptions while no difference between them was found on job-focused attitude. Thus, the relative importance of PO\_fit and PJ\_fit perceptions needs further examination particularly in their relations with organization-focused attitudes.

The most critical findings of this study are the effects of PO\_fit x PS\_fit and PJ\_fit x PS\_fit on OC. According to the results, PO\_fit or PJ\_fit perception had stronger relationship with OC when individuals perceive high PS\_fit. These findings suggest that PS\_fit perceptions are combined with PO\_fit or PJ\_fit perceptions in a more complex way rather than in a simple additive way. Individuals' perceptions of fit with their supervisors can be important situations or moderators that strengthen or weaken the relationships between PO\_fit or PJ\_fit perception and OC. Especially, a supervisor may be an environment most proximal to or a significant other to individuals at work. When individuals perceive low fit with their supervisors, they tend to pay more attention to the low PS\_fit and less attention to other types of fit (i.e. PO\_fit or PJ\_fit) for their evaluation of commitment to an organization. In contrast, when individuals experience high fit with their supervisors, they do not have

to pay much attention to PS\_fit and tend to pay more attention to other types of fit for their evaluation of OC. This explanation is in line with the argument made in selection decision by<sup>34</sup>. The moderating effects of PS\_fit were not found in the relationships between PO\_fit or PJ\_fit perceptions and JS. PS\_fit perception may be an important situation affecting the evaluation of organization-focused attitude, but not be an important context affecting the evaluation of job-focused attitudes. This results would tell that supervisors play a more critical role to form individuals' attitudes about an organization rather than attitudes toward a job. Supervisors are usually considered as an agent of an organization and as one specific type of person-organization fit<sup>38</sup>.

### **B. Strengths and Limitations**

One of the strengths is that this study examined multiple levels of fit perception in a single study. Most of previous research has examined only one level of PE\_fit. Even the research examining multiple levels of fit perception included only two level of PE\_fit. This study examined three levels of fit perceptions including PO\_fit, PJ\_fit, and PS\_fit in the same study. The examination of these levels of fit simultaneously provides a more realistic and comprehensive picture about the influence of PE\_fit perceptions because people at work interact with their organizations, jobs, and supervisors on a daily basis. The second strength is that the sample of this study consisted of individuals with different job types and job ranks in various companies across several industries. Job type, job rank, and industry were controlled in the regression analyses to test our hypotheses. Compared with the studies using the sample in the same job type, the same job ranks, or one company or industry, the results of this study can relatively be easy to generalize across various job types and ranks and various organizations and industries. The third strength is that this study tried not to mix different characteristics or content dimensions in conceptualizing and measuring each level of fit perceptions. PO\_fit perception was conceptualized in terms of value congruence and PJ\_fit in terms of demands-abilities fit. This conceptualization is the most widely used in the studies on PE\_fit perceptions<sup>15</sup>. Accordingly, this study did not confound the conceptualization of each fit perception with its measurement<sup>18</sup>. In this study, however, different levels of fit perceptions were defined using different content dimensions. Future research needs to deal with this issue when examining multiple levels of fit perceptions in a single study. For example, it should be carefully concerned that the differences in environment levels or targeting referents are not confounded with the differences between supplementary fit and complementary fit.

This study measured perceived fits along with work attitudes such as OC and JS. Thus, as addressed by<sup>25</sup>, a question can arise about whether all the measures are simply tapping into overall affect-laden judgments. In addition, a common methods bias or a same source bias can be involved in the results since this study measured fit perceptions and work attitudes based on self-reports.

In conclusion, this study shows that both PO\_fit and PJ\_fit are important, as they independently affect OC as well as JS. This study also shows that the impacts of PO\_fit or PJ\_fit on OC are stronger when individuals perceive high PS\_fit. Future research needs extend this study using other attitudinal and behavioral outcomes. In addition, future research needs consider other content domains for the conceptualization of various fit levels. For example, in addition to value congruence, goal, personality, interest congruence can be considered for the conceptualization of PO\_fit. A needs-supplies component can also be considered for the conceptualization of PO\_fit or PJ\_fit. Furthermore, considering the possibility that PO\_fit and PJ\_fit perceptions differentially relate to various outcomes, it will be useful to examine what levels or types of fit are more strongly associated with particular outcomes in what situations. As suggested by<sup>39</sup>, the examination of contingency variables is required to identify relative importance of various level of PE\_fit.

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## The Effects of Efficacy and Social Networks on Foreign Working People's Adjustment: The Mediating Effects of Hope

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### Abstract---

**Objectives:** This research was conducted to verify the impact of efficacy, social networks, and hope among 488 foreign working people in Korea on their adjustment to a new society.

**Statistical analysis:** Collected data were analyzed using statistical programs of SPSS PC+ Win. 21.0 and Amos 21.0. The study performed frequency, reliability, and correlation analysis, structural equation modeling, and Sobel's test.

**Findings:** The results of the study are as follows. First, there were statistically significant positive correlations between self-efficacy, hope, and social networks. Also, there was a significant negative correlation between communication, agency thinking and pathway thinking. In addition, adaptation to the society had a significant negative correlation with pathway thinking. However, interpersonal relationship did not have a significant correlation with self-efficacy and agency thinking. Second, self-efficacy had a significant impact on hope and on adaptation to the society. Hope had a significant impact on adaptation to Korean society. Social networks significantly affected on hope but had no direct impact on adaptation to the society. Third, hope partially mediated in the relationship between efficacy and adjustment to the society, and also perfectly did in the relationship between social networks and adaptation to the society.

**Application:** These results of this study will be effectively used to enhance the adaptation to a new society in which immigrants moved newly.

**Keywords---** Efficacy, Social Networks, Adjustment, Hope.

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## I. INTRODUCTION

In Korea, there has been a rapidly growing demand for foreign working people for small and medium enterprises due to technological advances, the low birth rate, the aging population, and environmental changes in the labour market. As a result, many foreign working people have flowed into Korea since the late 1980s. However, they are still suffering from many problems such as human rights violations and violence that has often led to an exodus of these working people. In this regard, there is a growing need for a study to attract national interest and prepare measures for the adjustment of foreign working people; the aforementioned problems could lead to not only serious social issues but also labour market problems such as gaps between supply and demand for manpower.

Social networks perform an important role in helping immigrants adapt successfully to new societies. Social networks are a structure of social organization<sup>1</sup>. That is, it is a unit of interpersonal solidarity that connects immigrant working people, previous immigrant working people, and non-immigrants through contact between labour-exporting to labour-importing countries<sup>2</sup>. According to a previous study, when foreign working people face difficulties related to new jobs, they send text messages to their home countries rather than calling for help from Korean friends<sup>3</sup>. A more recent study also showed that a majority of foreign working people rely on their peers and relatives in their respective home countries even while they live in Korea<sup>4</sup>. It is of interest to identify the impact of these home country text messages on how the foreign working people's adjustment. In addition, self-efficacy can be deemed one of the important variables in how foreign working people adapt to a society. Efficacy refers to a belief in one's competence to fulfill tasks and also one's perception of the ability to perform these tasks<sup>5</sup>. Persons with similar levels of capability may or may not fulfill their given tasks in the same environment depending on their levels of efficacy<sup>6</sup>. Thus, efficacy among foreign working people is related to work performance ability, work performance confidence, and practical work experience. It may also become a main variable for how foreign working people's adjustment, and thus, there is a need to analyze the phenomenon.

Meanwhile, foreign working people usually have a high degree of desire to succeed in Korean society, and they are thus highly motivated to succeed in their work. This phenomenon can be explained by hope, which is referred to a positive state of thought that is divided into pathway and agency thought<sup>7</sup>. Pathway thought refers to finding and utilizing diverse ways to achieve desired objectives. Agency thought refers to the personal perception of one's own ability to use pathways to achieve objectives<sup>8</sup>. People who have high levels of hope are willing to take on new challenges, and they tend to perceive the possibility of achieving objectives, whereas people with low levels of hope do not do their utmost<sup>9</sup>. In addition,<sup>10</sup> emphasized the effectiveness of hope in diverse domains of the social adjustment and lives of immigrants to their respective host countries. However, very few studies have examined hope in foreign working people, and thus there is a growing need to validate its mediating effect on adjustment.

Studies on foreign working people began to be published in 1991 with the first influx. The majority of these studies focused on how foreign working people adapted<sup>11-23</sup>. Some of the previous studies examined hope in immigrant women<sup>24</sup>; however, none has so far examined the hope of foreign working people. Although a number of domestic studies have examined the efficacy and social networks in relation to immigrant women, children, youth, elderly and athletes, only a handful of the previous studies focused on the efficacy of foreign working people.

Therefore, the study was carried out to identify the impact of efficacy, social networks, and foreign working people's hope on their adjustment. To this end, this study established the following research questions. Firstly, what are the correlations between efficacy, social networks, hope, and foreign working people's adjustment? Secondly, what about the relationship between the self-efficacy, social networks, hope and foreign working people's adjustment? Thirdly, what is the mediator of hope in the relationship among efficacy, social networks, and adjustment to the new society.

## II. METHOD

### A. Research Model

This study set the research model shown in Figure 1 on the basis of the preceding studies. That is, the study established the path by which efficacy affects adjustment and also the path by which social networks

and hope affects indirectly adjustment. Moreover, this study establishes a direct path with social networks and adjustment and the indirect and direct paths via hope.

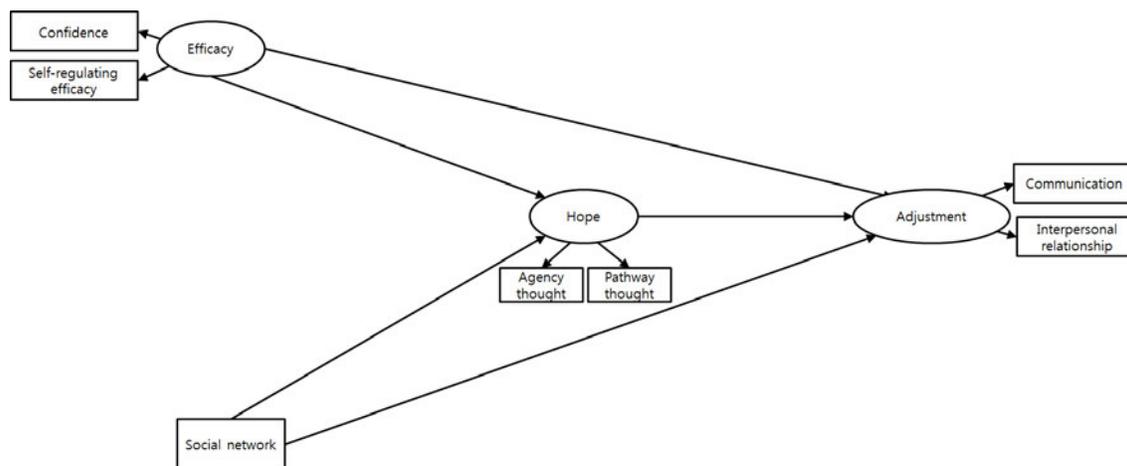


Figure 1: Research Model

### B. Participants and Data Collection

This study used convenience sampling for the 11 regions (5 capital regions and 6 Chungcheong regions) of Korea and purposive sampling with 488 foreign working people from the 11 regions. In regard to the general participant characteristics, women accounted for 14.7% and those working in the manufacturing industry accounted for 45.9%. People from Vietnam accounted for 36.8 %, and Buddhism accounted for the largest proportion among religions at 47.3%. For marital status, both married and single individuals accounted for roughly similar proportions. By region, most participants were from small or medium-sized cities and rural areas. For monthly income, KRW 1.51 million to 2 million accounted for the largest ratio, and by education level, participants with a high school diploma or higher were the highest.

### C. Tools

#### Efficacy

The scale developed by<sup>25</sup> was used to measure efficacy, specifically, confidence and self-control. There are 11 questions in total, measured on a 5-point Likert scale, so that a higher score indicates greater efficacy. The Cronbach's  $\alpha$  for confidence was 0.780, and that for adjustment in personal relationships was 0.777.

#### Social Networks

The support network scale developed by<sup>26</sup> and<sup>27</sup> was used to measure social networks after revision and supplementation. It consists of 6 questions on a 5-point Likert scale, where higher scores indicated higher in social networks. The reliability achieved Cronbach's  $\alpha = 0.761$ .

#### Hope

To measure hope, this study used the Korean Dispositional Hope Scale (K-DHS) validated by<sup>28</sup>, a validated version of the Dispositional Hope Scale (DHS) by<sup>29</sup>. There are 8 questions in total, also on a 5-point Likert scale, such that a higher score indicates more hope. Agency thought had a Cronbach's  $\alpha$  of 0.673, and that of pathway thought was 0.697.

#### Adjustment

In order to gain a comprehensive understanding of the degree of social adjustment, including working people's cultural and psychological adjustment, the scale used in the research of<sup>30</sup>,<sup>31</sup>,<sup>32</sup>, and<sup>33</sup> was used after revision and supplementation to make it suitable for this specific research. It consists of 12 questions that measure adjustment in communication and in personal relationships, with higher scores reflecting better adaption to society. The reliability of adjustment in communication achieved Cronbach's  $\alpha = .833$ , and that of adjustment in personal relationships was 0.770.

**D. Data Analysis**

Collected data were analyzed using statistical programs of SPSS PC+ Win. 21.0 and Amos 21.0. For the statistical analysis, descriptive statistics, reliability analysis, correlation analysis, mean comparison analysis, and structural equation modeling were utilized.

**III. RESULTS**

**A. Correlation Analysis and Descriptive Statistics**

This study conducted Pearson correlation analysis to investigate the correlation between the variables as shown table 1. The study found statistically significant positive correlations between efficacy, hope, and social networks. In addition, there were significantly negative correlations between communication, agency thought, and pathway thought, and adjustment had a significant negative correlation with pathway thought, a sub-factor of hope. However, interpersonal relationships, which are a sub-factor of adjustment, had no significant correlation with efficacy or agency thought, a sub-factor of hope.

In regard to skewness and kurtosis, the absolute values for skewness and kurtosis were lower than 3 and 8, respectively, both of which constituted normal distributions based on the criteria proposed by West<sup>34</sup>.

Table 1: Correlation Analysis

	1. Confidence	2. Self-regulating efficacy	3. Social network	4. Agency thought	5. Aathway thought	6. Communication	7. Interpersonal relationship
1	1						
2	0.711**	1					
3	0.551**	0.600**	1				
4	0.561**	0.529**	0.526**	1			
5	0.489**	0.544**	0.537**	0.614**	1		
6	-0.231**	-0.113*	-0.257**	-0.245**	-0.298**	1	
7	-0.022	-0.056	-0.066	-0.067	-0.117**	0.465**	1
M	3.8831	3.7174	3.7596	3.9491	3.8498	2.2145	2.7925
SD	0.85259	0.73490	0.67775	0.65227	0.70446	0.82338	0.76089
Skewness	-0.771	-0.656	0.336	-0.792	-0.580	0.615	0.157
Kutosis	0.458	0.748	0.033	1.362	0.745	-0.115	-0.115

\*p<0.05, \*\*p<0.01

**B. Validating the Modified Model**

To identify the structural relationships in the research model, the study analysed measurement model, convergent validity, and model analysis. In addition, this study validated the research model and thus confirmed that the path between social networks and adjustment was not significant. Accordingly, we deleted the corresponding path and performed to modify the research model.

Table 2: Comparison of Indices for the Research and Modified Models

Classification	$\chi^2$	df	NFI	TLI	CFI	RMSEA
Research model	39.295***	9	0.970	0.946	0.977	0.083
Modified model	43.694***	11	0.967	0.952	0.975	0.078

\*\*\*p<0.001

The results of modifying the model are more acceptable in the goodness of fit as shown in Table 2. Thus, this study selected the modified model as the final model. The validation results for the modified model and each path coefficient are shown in Figure 2 and Table 3. All of the paths between the efficacy and hope of foreign working people ( $\beta=0.619$ ,  $p<0.001$ ), between social networks and hope ( $\beta=0.269$ ,  $p<0.001$ ), between hope and adjustment ( $\beta=-0.569$ ,  $p<0.001$ ) and efficacy and adjustment ( $\beta=0.260$ ,  $p<0.05$ ) were significant. That is, foreign working people's efficacy had a direct impact on their adjustment and an indirect impact on adjustment via hope. In addition, the study found that social networks did not have a direct impact on adjustment; rather, it had an indirect impact via hope. In the modified model, hope was a main factor in adjustment.

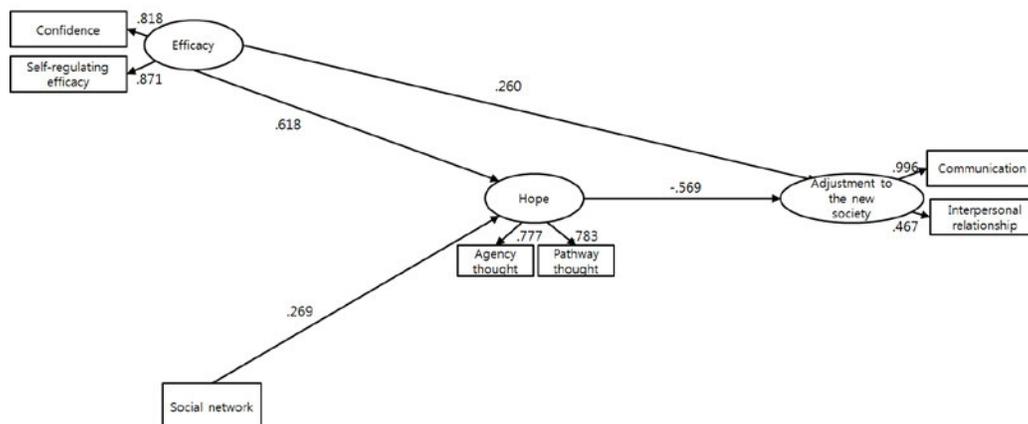


Figure 2: The Modified Model

Table 3: The Analysis of the Modified Model

Path between variables	B	$\beta$	S.E	t
Efficacy → Hope	0.491	0.619	0.055	8.986***
Social network → Hope	0.201	0.269	0.043	4.677***
Hope → Adjustment	-0.921	-0.569	0.195	-4.721***
Efficacy → Adjustment	0.334	0.260	0.148	2.259*

\*\*\* $p < 0.001$

### C. Validating the mediating effects

This research performed Sobel’s test to identify whether hope was a mediating variable in the relationships between foreign working people’s efficacy and social networks and their adjustment and between social networks and adjustment. The validation results are as follows as shown in Table 4. First, the path between efficacy and adjustment to the society was  $Z = -4.1748$ ; that is, there was a partial mediating effect at the significance level of  $p < 0.001$ . The path between social networks and adjustment was  $Z = -3.3224$ , also a significant mediating effect at  $p < 0.001$ . That is, foreign working people’s efficacy had a direct impact on their adjustment to the new society but also an indirect impact through hope. Social networks did not have a direct impact on the working people’s adjustment to the new society, but there was an indirect impact via hope.

Table 4: Mediating Effects of Hope

Path	Z	p
Efficacy → Hope → Adjustment	-4.1748***	0.0001
Social network → Hope → Adjustment	-3.3224***	0.0001

\*\*\* $p < 0.001$

## IV. DISCUSSION

The study results are discussed below. First, this study found statistically significant positive correlations between efficacy, hope, and social networks and significantly negative correlations between communication, agency thought, and pathway thought. Moreover, adjustment had significant negative correlations with social networks and pathway thought. These findings are contrary to the other results that hope had positive correlations with the variables such as adjustment to a host country society. It is possible that the hardships felt by the foreign working people in adapting were reflected in this study results.

Second, efficacy had a significant impact on hope and adjustment. This result is similar to the result that people with a higher degree of efficacy adapted to school life more successfully. Moreover, the current study’s finding is also consistent with the result that hope played a partial mediating role in the relationship between efficacy and creativity. Social networks had a significant impact on hope but no direct impact on adjustment. These findings were inconsistent with the result that social networks were significantly related to quality of life and that the frequency of social network use was a significant variable in physical quality of life. This is

likely because foreign working people mainly interact with their peers from their respective home countries in their social lives. Moreover, hope was found to have a significant impact on adjustment, and this finding is consistent with the result that hope was the only variable that influenced female middle school students' adjustment.

Third, hope had a partial mediating variable in the relationship between efficacy and adjustment and a perfect mediating variable between social networks and adjustment. That is, foreign working people's efficacy had a direct impact on their adjustment and also an indirect impact via hope. In contrast, social networks did not have a direct impact on adjustment, but there was an indirect impact via hope.

The following recommendations can be suggested based on the above findings. First, it was confirmed that hope was an important variable in foreign working people's adjustment. Thus, it is necessary to develop hope enhancement programs that help foreign working people stably adapt and increase their capacity to contribute as community members.

Second, this study identified the impact of efficacy, social networks, and hopes on foreign working people's adjustment and found that the poor adjustment of foreign working people can cause diverse social problems. Thus, it is urgent to study diverse variables related to their adjustment from a more specific and systematic perspective.

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# The Effects of Patent and Paper Evaluation Indicators on the National Technology Level: The Case of Smart Services and Information Protection

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## Abstract---

**Objectives:** It is important job of every government to inject the proper amount of research and development investment regarding the economic situation and develop strategies to enhance the efficiency of the budget. However, in investing such budget, there is a lack of concrete measures and objective grounds that allows each country's characteristic to assess and reflect.

**Methods/Statistical Analysis:** Therefore, in terms of smart services and information security technologies, this paper will first examine whether the four objective evaluation indicators (patent activity, patent citation, paper activity, and paper citation), which are based on patents and statistics from academic literature, have a significant effect on the technology level that is based on the subjective answers of experts. The paper then aims to suggest a practical model for evaluating a level of technology based on patent and paper evaluation indicators, which has a significant effect on the technology level in the Delphi Survey.

**Findings:** Many countries' technology level is greatly influenced by patent and paper citations, that is, the product of R&D, which is related to the quality of patents and papers. In addition, it was found that Delphi Survey's values given by experts do have a significant effect on the number of patent applications, patent citations, and paper citations, but does not present any significant effect on the number of papers. It is believed that this is because the exclusive rights to a patent have a greater direct effect on the market than those of a paper. In other words, a patent application is the ultimate consequence of the products of a technology to exercise exclusive rights in the market. Therefore, all technologies are racing against time for patent applications and filings to secure exclusive rights and win the upper hand. Due to such activities, patents cause a greater effect on the Delphi Survey's values compared to papers.

**Improvements/Applications:** It is expected that future research will develop a more holistic model of the technology level evaluation of each country that integrates patent and paper indicators through a further comparative analysis of a variety of industries.

**Keywords---** Patent Evaluation Indicator, Paper Competitiveness, Technological Level, Paper Indicator, Information Protection, Smart Service.

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## I. INTRODUCTION

Developed countries around the world are establishing plans and heavily investing national budgets in services such as the IoT, smart homes, smart media, and RFID/USN in order to benefit from the first-mover advantages in the global market and strengthen technological competitiveness<sup>1,2</sup>. IoT is a technology that obtains real-time contextual information from the surrounding environment and communicates the data in a network to which various devices are connected. Examples of this technology include smart homes, media, cars, and factories. The communicated information can be collected and abused by anybody; thus, it is imperative to pay close attention to information protection. Information crimes such as hacking, data leakage, cyber-terrorism, and internet scams have grown to affect not only individuals, but also entire societies. Therefore, research and development on developing information security models have been actively conducted in order to protect information assets from security threats.

Developed countries are establishing and executing investment strategies for research and development in order to enhance the efficiency and effectiveness of their massive investments into smart services and information security.

To this end, it is essential to evaluate the technology level of countries in terms of smart services and information protection technologies. In order to evaluate countries' technology level, it is necessary to overcome the limits of the survey method which is dependent on the subjective opinions of experts. Accordingly, there is a growing demand for measurement methods and evaluation of the national technology level through patents and paper indicators, which are the result of R&D<sup>3,4,5</sup>.

This paper will calculate patents and the values of the paper evaluation index for each country using the statistics on smart services and information protection technologies. By doing so, the aim of the paper is to examine whether the patents and paper evaluation indicators have a significant effect on the Delphi Survey's technology level.

This paper is organized as follows. Section 2 presents the literature review on the technology level evaluation model, patent evaluation indicators, paper evaluation indicators, and technological levels. Section 3 demonstrates a research model which examines the significance of the relationship between patent and paper evaluation indicators and Delphi Survey's technology level. The empirical analysis is described in Section 4 to determine the effect of the patent and paper evaluation indicators on the Delphi Survey's technology level. The conclusions are given in Section 5.

## II. THEORETICAL BACKGROUND

### A. *Technology Level Evaluation (TLE)*

Since the country's competitiveness in the future depends on scientific technology, many indicators have been widely researched to measure changes in scientific technology capabilities over decades. As a result, the indicators have also been used to predict national technological level, assess market environments, and improve national technological level<sup>6</sup>.

However, thus far, no standardized technological level evaluation methods have been proposed. The existed methodologies include expert interviews, surveys, and the Delphi method<sup>7</sup>.

In such evaluations, technology level is defined as the "measured value of the performance of a specific technology at a specific point in time"<sup>8</sup>.

### B. *Patent Indexes*

A patent index is a tool to analyze technological properties from macro and micro perspectives. It explains the grounds that support the national innovation system, tracks the level of knowledge dissemination between states, industries, technology fields, and enterprises. Furthermore, it is used to measure research and development outcomes, as well as the structure and development level of specific technologies and industries; ultimately, it can be the most logical tool to measure or evaluate technological outcomes<sup>9</sup>.

A patent indicator is an index that measures the innovational and technological values of a patent based on bibliographical data found in the relevant documents, that is, the number of patent applications and families, citations, triadic patents, and patents registered in the US. Patent indexes were defined as a tool that

measures the quality and properties of a patent<sup>10</sup>; it is possible to measure the various creditable data that a patent possesses by using these indicators<sup>11</sup>.

As suggested in Table 1, eleven patent indicators are categorized and suggested, which are important for analyzing technology strategy<sup>12</sup>.

Table 1: Literature

Studies	Patent statistics										
	NP	PGPA	PCPA	NF	CI	CII	TS	TCT	NC	TI	RPA
13	*				*			*		*	
14	*				*						
15	*			*							
9	*	*	*	*	*						
16	*	*	*		*	*	*	*			
17	*								*		
18				*	*						
19											*
20	*				*	*		*		*	
21									*		
22	*	*			*	*		*	*		
23	*					*		*			

Table 2 suggests two patent evaluation indicators based on the patent filed number and patent cited number.

Table 2: Patent Evaluation Indicators

Variable	Definition
<b>PAI</b> Patent activity index	The total of filed patents from a specific country / the total of filed patents from all countries
<b>PCI</b> Patent activity index	The total of cited patents from a specific country / the total of cited patents from all countries

**C. Paper Indicators**

This information provides a foundation for the quantitative evaluation of the level of human development including scientific technology<sup>24</sup>. A paper indicator is a tool to analyze the outcomes and levels of research projects. Numerous researchers are investing effort to further study this matter.

Qualitative or quantitative statistics in papers can be used to study the status of cooperation and competition in scientific technologies between countries<sup>25</sup>. In general, paper indicators consist of the number of published papers, which evaluates the quantitative aspect, while the number of paper citations evaluates the qualitative aspect. The number of published papers and paper citations can be used as indexes to measure

R&D productivity and the effect of scientific technologies <sup>26</sup>.As shown in Table 3, two paper evaluation indicators (BAI and BCI) are suggested as paper quantity and quality measuring indicators.

Table 3: Paper Evaluation Indicators

Variable	Definition
<b>BAI</b> Bibliometric Activity Index	The total published papers from a specific country/ the total registered papers from major countries
<b>BCI</b> Bibliometric Activity Index	The total cited papers from a specific country/ the total cited papers from major countries

### III. STUDY DESIGN

#### A. Study Model

Figure 1 shows the study model. This study validates whether the patent and paper indicators (patent activity, patent citation, bibliometric activity, bibliometric citation) affect the Delphi Survey's technology level. Based on these indicators that affect the Delphi Survey's technology levels, a new technological level evaluation model is then proposed.

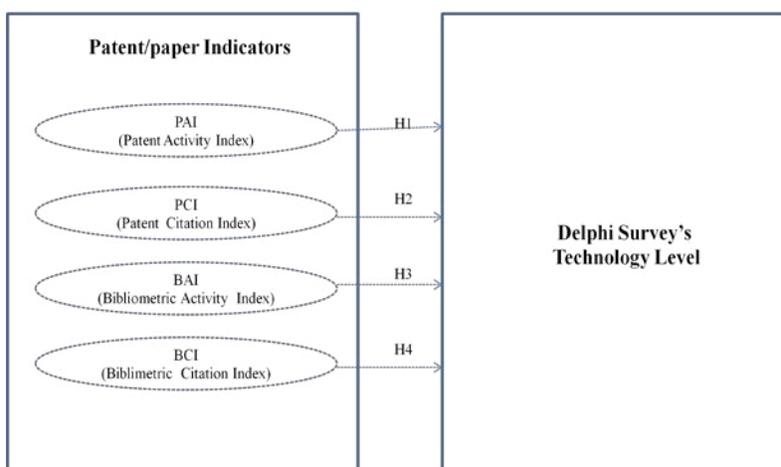


Figure 1: Study Model

#### B. Hypothesis Setting

##### PAI

The PAI is used to measure the relative level of technology sectors between countries. The PAI value increases in proportion to national R&D investment. Thus, the following hypothesis (H1) is formulated.

H1: PAI has a positive effect on Delphi Survey's technology level.

##### PCI

The number of patent citations of a country on a specific technology is positively influenced on the national technology level. Thus, the next hypothesis (H2) is as follows.

H2: PCI has a positive effect on Delphi Survey's technology level.

##### BAI

The BAI is used to measure the relative level of technology sectors between countries. The BAI value increases in proportion to R&D investment, thereby resulting in more registered papers. As a result, the BAI is positively influenced on the national technology level. Thus, following hypothesis (H3) is formulated.

H3: BAI has a positive effect on Delphi Survey's technology level.

**BCI**

The number of paper citations of a country on a specific technology is positively influenced on the national technology level. Hence, the formulated hypothesis is as follows.

H4: BCI has a positive effect on Delphi Survey's technology level.

**C. Study Process**

To validate the study model proposed herein, this study follows four stages targeting smart services and information protection technologies in the ICT sector. First, the technology tree of the smart service and information protection are classified and the search keywords are identified. Then, patent and paper data are gathered. Based on the collected patent and paper data, four indicators are calculated. Lastly, multiple regression analysis is performed to analyze the effect of the patent and paper indicators on Delphi Survey's technology level.

**IV. EMPIRICAL ANALYSIS**

**A. Technology Tree**

Table 4 shows the target technologies and the technological classification of smart services and information protection technologies; they are used by experts in universities, industries, and research institutions under the Korean Ministry of Science.

**B. Patent Analysis Data**

Patent data were extracted through keyword searches according to the technology classifications in Table 4. They were based on patents with filing disclosure dates between January 1, 2000 and December 31, 2014, as disclosed by the patent offices of the Republic of Korea, the United States, Japan, and Europe.

Table 4: Classifications of Smart Services and Information Protection Technologies

Smart services	Internet of Things (IoT)
	Smart home
	Smart media
	Device
	RFID/USN
Information protection	Common-based security
	Service security
	Physical security
	System security
	Convergence security

As shown in Table 5, the total number of patents filed in the five countries with the most patent applications on the related technologies during the 15 years from 2000 to 2014 are 142,252 and the total with patent citations are 386,715.

Table 5: Patent Statistics on Smart Services and Information Protection

Statistical item	patent filed number	patent cited number (USPTO)	Total
CN	5,664	1,253	25,844
JP	20,141	44,390	148,899
KR	12,699	19,027	81,834
EU	34,565	33,025	259,346
US	69,183	289,020	721,667
<b>Total</b>	142,252	386,715	1,237,590

CN stands for China; JP, Japan; KR, Republic of Korea; EU, the European Union; SW, Sweden; And US, the United States.

**C. Paper Analysis Data**

The paper data were extracted through keyword searches according to the technology classifications in Table 5. As shown in Table 4, the paper analysis data of this table are papers from the SCOPUS database during the period January 1, 2000 to December 31, 2014. The evaluation of paper indicators was conducted based on the number of paper registrations and citations of the five countries.

As shown in Table 6, the total number of paper publications of the five countries having the highest registration rate of papers on related technologies during the last 15 years from 2000 to 2014 is 104,268 and the total of paper citations are 1,221,865.

Table 6: Aggregate Paper Statistics on Smart Services and Information Protection

Statistical items	Number of papers	Number of paper citations	Total
CN	27,961	115,713	143,674
JP	5,560	42,805	48,365
KR	5,600	38,418	44,018
EU	35,564	437,076	472,640
US	29,583	587,853	617,436
Total	104,268	1,221,865	1,326,133

CN stands for China; JP, Japan; KR, Republic of Korea; EU, the European Union; SW, Sweden; And US, the United States.

**D. Patent and Paper Evaluation Indicators**

Based on the 142,252 filed patents, 386,715 patent citations, 104,268 published papers, and 1,221,865 paper citations of the 51 subsectors in the smart services and information protection technology sectors from 2000 to 2014, four indicators were calculated on each of all technologies subsectors. The calculated indicators were transformed into square roots.

The TLE values of the Delphi Survey are the results of a research conducted by experts in the universities, industries and research institutions under the Korean Ministry of Science, ICT<sup>27</sup>.

**E. Multiple Regression Analysis**

Multiple regression analysis was performed to verify whether the values of the four patent and paper evaluation indicators (PAI, PCI, BAI, and BCI) of smart services and information protections technologies have a significant effect on Delphi Survey's TLE.

In order to conduct multiple regression analysis, multi-collinearity was verified between the dependent variable, which is the autocorrelation of the TLE values, and the independent variables, patent and paper evaluation indicators (PAI, PCI, BAI and BCI).Durbin-Watson statistic was used to test for the auto correlation of the dependent variable. The statistic calculated 1.268 for the estimated TLE values for the five countries. Since this result is close to 2 and it is neither close to 0 nor 4, it is independent and not auto-correlated.

The VIF (Variance Inflation Factor) was used to test for multi-collinearity in the independent variables. All theVIF values were below 10. Thus, it can be concluded that the data are suitable for regression analysis Table 7.

Table 7: TLE among Nations

Nation	PAI	PCI	BAI	BCI	Delphi Survey's TLE
CN	0.22	0.29	0.51	0.33	54.26
JP	0.30	0.91	0.25	0.19	41.61
KR	0.36	0.72	0.29	0.24	45.81
EU	0.42	0.85	0.56	0.58	67.53
US	0.69	1.10	0.47	0.63	67.27

TLE is Technology Level Evaluation.

Table 8 shows the results of the multiple regression analysis. PAI(p<.05), PCI(p<.05), and BCI(p<.05) have a significant effect on Delphi Survey's TLE. The higher the PAI (B value (113.253)), PCI (B value (22.112)), and BCI (B value (27.535)), the higher the TLE; the explanatory power of these independent variables was 76.2% in explaining the variation in the dependent variables. However, BAI(p>.05) did not have any significant effect on Delphi Survey's TLE.

Table 8: Regression Analysis Results

Dependent variable	Independent variable	B	SE	$\beta$	t	p	VIF
DS_TLE	Constant	68.600	1,655		41,453	.000	
	PAI	113.253	15.204	.610	7.449	.000*	3.019
	PCI	22,112	8.322	.171	2.657	.009*	1.870
	BAI	-7.996	4.240	-.100	-1.886	.062	1.267
	BCI	27.535	8.828	.218	3.119	.002*	2.189
	R2=.873, Modified R2=.762, Regression df=4, Residual df=107 F=85.701 P=.000, Durbin-Watson=1.268						

\* p< 0.05

DS\_TLE is Delphi Survey's TLE.

**F. Hypothesis Validation**

The hypothesis test results are presented in Table 9.

Table 9: Hypothesis Test Results

Hypothesis	H 1	H 2	H 3	H 4
	PAI	PCI	BAI	BCI
DS_TLE	$\beta = .610$ p=.000*	$\beta = .171$ p=.009*	$\beta = -.100$ p=.062	$\beta = .218$ p=.002*
Support	Yes	Yes	No	Yes

\* p< 0.05

DS\_TLE is Delphi Survey's TLE.

In PAI, the standardized regression coefficients ( $\beta$ ) have a positive (+) effect and the level of significance shows a significant result; thus, H1 is accepted.

In PCI, the standardized regression coefficients ( $\beta$ ) have a positive (+) effect and the level of significance shows a significant result; thus, H2 is accepted.

BAI does not show any significant result and, therefore, is rejected.

In BCI, the standardized regression coefficients ( $\beta$ ) have a (+) positive effect and the level of significance shows a significant result; thus, H4 is accepted.

**V. CONCLUSION AND IMPLICATION**

In this research, empirical analysis was conducted on smart services and information protection technologies to examine whether the four patent and paper evaluation indicators (that is, PAI, PCI, BAI and BCI) have a significant effect on Delphi Survey's TLE values.

The results of the research are as follows. PAI, PCI, and BCI have a positive (+) effect on Delphi Survey's TLE values. In contrast, BAI does not have any significant effect.

The results of this paper show that many countries' technology level is greatly influenced by patent and paper citations, that is, the product of R&D, which are related to the quality of patents and papers. In addition, it was found that Delphi Survey's TLE values given by experts do have a significant effect on the number of patent applications, patent citations, and paper citations, but does not present any significant effect on the number of papers. It is believed that this is because the exclusive rights to a patent have a greater direct effect on the market than those of a paper. In other words, a patent application is the ultimate consequence of the products of a technology to exercise exclusive rights in the market. Therefore, all technologies are racing against time for patent applications and filings to secure exclusive rights and win the upper hand. Due to such activities, patents cause a greater effect on the Delphi Survey's TLE values compared to papers.

Lastly, this research studied the effect of the relations between the Delphi Survey's TLE values given by experts and the quantitative four evaluation indicators of patents and papers. However, there still remains much room to study the effects that patent and paper evaluation indicators have on a country's technology level. It is expected that future research will develop a more holistic model of the technology level evaluation of each country that integrates patent and paper indicators through a further comparative analysis of a variety of industries.

## ACKNOWLEDGMENT

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# The Analytic Design Application of the Cognitive Interface for a Digitalized Control Environment

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## Abstract---

**Objectives:** This study aims to show the feasibility of the application of Ecological Interface Design (EID) method that may improve operator performance in digitalized system environment such as main control room in next generation nuclear power plant.

**Methods/ Analysis:** While cognitive interface design method such as Information Rich Display (IRD) is mainly focused on stereotyped information for the user, EID method helps users' mental resources to be allocated to tasks that process highly abstract information including diagnosis and situation assessment. However, the sophisticated and relationship-embedded EID displays may cease to be intuitive when many of them are presented without consistently designed common elements.

**Findings:** This study showed the suggestion of the consistent elements of EID displays for a digitalized Main Control Room of Nuclear Power Plant taking the example of the control process of Steam Generator (SG) Water Level. The proposed EID displays were reviewed by domain experts and operators to conjecture how such EID displays might benefit the operator's decision making.

**Novel/Improvements:** The experience from this study indicates that situation awareness in digitalized interface design may be improved by appropriately designed visualization of abstract information and that operator may be aided by the represented dynamics in EID display.

**Keywords---** Cognitive Systems Engineering, Display Design, Ecological Interface Design, Work Domain Analysis, Abstraction Hierarchy.

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## I. INTRODUCTION

Complex human machine systems such as nuclear power plant and avionic system tend to adopt more and more digitalized human-machine interfaces such as computer based procedure, large display panel, and workstations with soft-control to help the operators make operational decisions more efficiently. The analog or partly digital-typed interface of main control room (MCR) in nuclear power plant (NPP) is gradually being replaced by the totally digitalized interface suitable for the digital environment. The main control room of SKN 3 & 4 NPP in Korea is among such examples (Figure 1).



Figure 1: Example of a Totally Digitalized MCR

As more amount of information is processed and delivered in a digitalized system, and as the information should be displayed on relatively limited space, the level of cognitive complexity, hence mental workload, in managing the human-system interaction is being increased. Human operators also tend to show over-reliance to the automated system which was developed to reduce human errors from the misuse of the digitalized interface different from the stereotyped one. In fact, the more the computerized devices and procedures are used in the system, the mental model of computer users has been more changed from analogue stereotype to digitalized one<sup>1</sup>.

All the information to be processed in a digitalized system cannot be displayed on the limited interface space so that crews make a decision relying on mental resources for abstracted information. For reducing the mental workload, the cognitive interfaces seem to work well by visualizing and displaying the abstracted information on the human machine interface. Cognitive interface suggests that the higher-order functional constraints governing the process be made directly available to operators in a manner allowing them to pick up that information using their cognitive capabilities.

Cognitive engineers have used two theoretical frameworks to design a cognitive interface; Information Rich Design (IRD) and Ecological Interface Design (EID). While Information Rich Display (IRD) is mainly focused on providing stereotyped information to the user, EID method effectively enables operators' mental resources to be concentrated on highly abstract information-based tasks such as diagnosis and problem solving. Being a relatively new approach to designing user interfaces, EID has been focused on the human-machine interfaces (HMI) for large-scale dynamic systems such as power plants, aircrafts, and ships. In EID methods, combined are the analytical tool of the Abstraction Hierarchy, human decision making strategies, and the insights of SRK taxonomy. The resulting design provides more intuitive and direct information to the human decision making tasks. The design is also expected to be more robust in unanticipated situations<sup>2</sup>.

A sophisticated unit of EID display represents multiple-level information by figuratively organizing the low-level variables involved. Conveying both the high-level information and its low-level components at the same time, the underlying relationships are easily perceived and intuitively understood. Eyes then trace the implied relations to utilize whichever level of information that is more directly useful in human decision making at a time.

Paradoxically, an almost inevitable drawback of EID comes from this sophistication. As many units of EID displays are presented, the complex and inventive figures may interfere with each other and become confusing. To cope with this problem, consistency should be introduced and observed. Not only the elementary representation of variables but also the ways in which relations are signified should be designed with consistency.

This paper describes an effort to suggest a set of consistent elements of EID displays for a digitalized Main Control Room of Nuclear Power Plant taking the example of the control process of Steam Generator (SG) Water Level.

## II. EID DESIGN PROCESS

The EID design process starts with work domain analysis (WDA) and proceeds with information analysis and EID element design and integration (Figure 2).

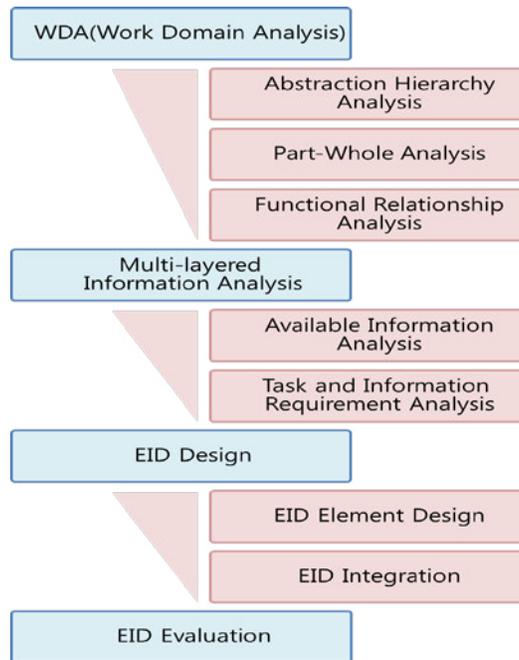


Figure 2: EID Design Process

### A. Work Domain Analysis (WDA)

WDA uses Abstraction Hierarchy (AH) as a fundamental scheme to analyze the dynamic environment or the work domain. Abstraction levels are reflecting goal-means relationship. Starting with the purpose level at the top, it goes down to the levels of abstract function, generalized function, physical function, and physical form. Functions at a level have semantic representations and relationships that are characteristic at the level. Thus, functional organization should be identified for each level of abstraction. For example, the functional organization analysis, when performed at the physical function level, would provide a diagram that is similar with the schematic in the large display panel in the control room. AH analysis may be performed at various levels of detail according to apart-whole hierarchy, but the functional organization analysis at each AH level achieves important parts of the purpose of the part-whole analysis.

### B. Information Analysis

Information analysis phase connects WDA and EID design phases, translating the functional description produced by WDA into information description that is required in actual EID design. As in the WDA phase, the information analysis is also performed in multiple layers according to the AH. An information item that appears at a higher level of abstraction is usually related to one or more items at the lower level, which are summed up to the higher level information item. These relationships are what the EID should attempt to preserve visually in the display.

Another source of EID's visual relationships is the causal or grouping relationships among information items that may be identified on the basis of the functional organization at each AH level. These relationships, when they are considered in human reasoning during tasks that use the information items, should be visually represented to aid the inference.

The first step of the information analysis is to enumerate all the available information<sup>3</sup>. Starting from the physical sensors, the analyst will identify all the information items that the sensors are able to deliver. Continuing with higher level function, more complex or processed information items are identified and listed. The list for a function may include simple sensor readings, abstract information from multiple sensor readings, or logically derived information from other functions but defined with regard to the function.

Then, it should be investigated how the information items and their relationships are to be used by the operator. Task analysis, such as HTA (Hierarchical Task Analysis), and strategy analysis are conducted for this purpose. The results are used to determine how and when the information should be presented in the display.

### C. EID Design

We propose that the EID design process be conducted in two stages: EID element design and integration. The morale is that consistency in elementary representation of relation patterns should be assured first. Then, the EID units can be progressively integrated to express information for larger functions. Sheer inventiveness may produce a very clever and effective EID display, but many such displays side by side for different functions would be very hard for the operator to understand and handle. The operator should be aided not only by visual momentum but also what we might call representational momentum.

## III. ANALYSIS AND DESIGN

### Defining the System

The scope of the system employing the cognitive interface to be designed was confined to display a control process of Steam Generator (SG) Water Level on main feed water system in a digitalized Main Control Room of Nuclear Power Plant (Figure 3).

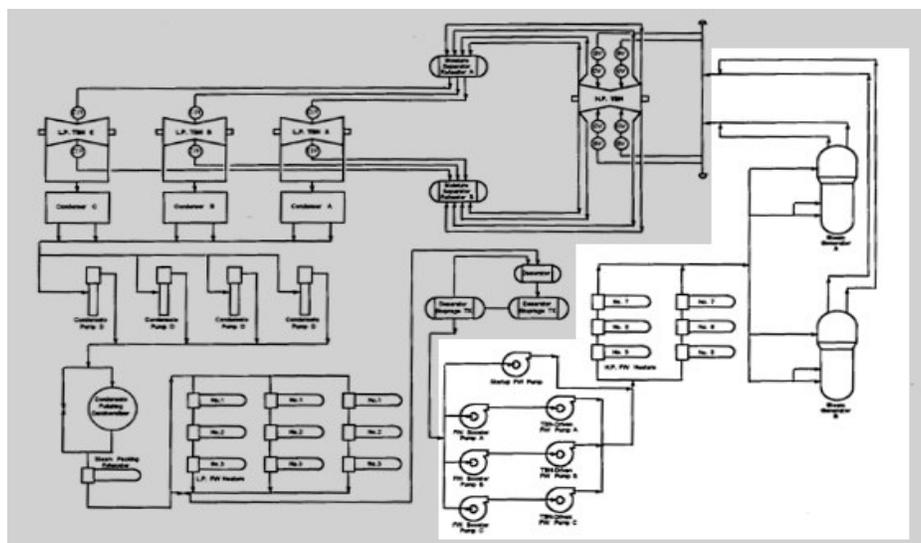


Figure 3: Main Feed Water System

### Abstraction Hierarchy

From the WDA of SG, in order to design the interface for maintaining water level of SG, two Functional Purposes (FP) were selected: 'Maintain water level' and 'Avoid Accident'. From the purposes, Physical Functions (PFn) were listed including pump, valve, u-tube, pipeline, heater, level indicator. Physical Form (PFm) included colour and shape of the PFn. Based on the PFn, Included General Functions (GF) were Activate pump, Heat increase by heater, Flow, Open-Close valve, Heat increase by u-tube, Transform liquid and gas, and Steam flow. The variables and processes are shown in Figure 4.

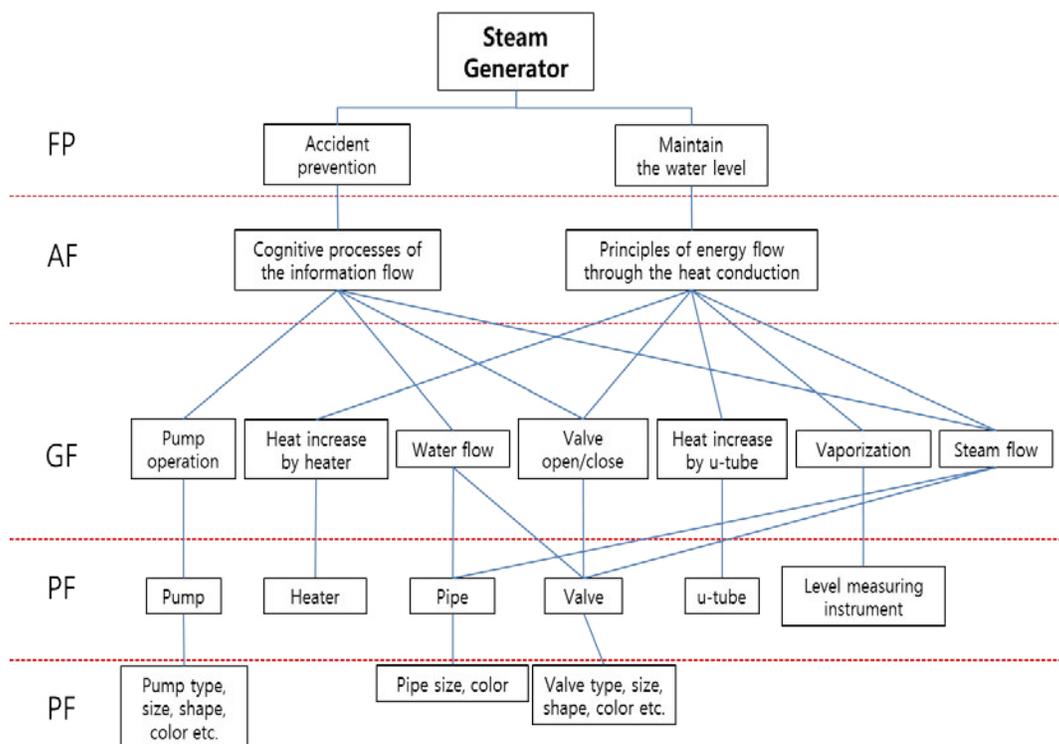


Figure 4: Abstraction Hierarchy of SG

**Information Requirement**

The WDA was conducted at various levels of detail along the Part-Whole Hierarchy of System-Subsystem-Components (Figure 5). Extracting information requirements from an AH involves converting the work domain model into a list of variables of SG.

	System	Subsystem	Components
FP	<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Accident prevention</div> <div style="border: 1px solid black; padding: 2px;">Maintain the water level</div>		
AF	<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Cognitive processes of the information flow</div> <div style="border: 1px solid black; padding: 2px;">Principles of energy flow through the heat conduction</div>		
GF		<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Pump operation</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Heat increase by heater</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Water flow</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Valve open/close</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Heat increase by u-tube</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Vaporization</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Steam flow</div>	
PF			<div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Pump</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Heater</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Pipe</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">Valve</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 2px;">u-tube</div> <div style="border: 1px solid black; padding: 2px;">Level measuring instrument</div>

Figure 5: Part-Whole Decomposition of SG

Hierarchical task analysis was performed with a well-organized in-use operational procedure, EOP, to confirm the information requirement obtained from WDA including a flow, pressure, temperature, and water level. The specific procedures of Emergency Operation Process (EOP) included LOCA (Loss of Coolant Accident), SGTR (Steam Generator Tube Rupture), and Reactor TRIP, which were related to information requirement from WDA.

**Information Displays**

From the results of WDA and task analysis (HTA), cognitive oriented displays were developed based on EID principles. The display elements were categorized into 3 classes: single variables, multiple variables, and integrated template.

Individual interface represents the system component. Single variable represents the values, trends, derivation, and reference point of variables (Figure 6). Multiple variables represent the relationship between variables (Figure 7).

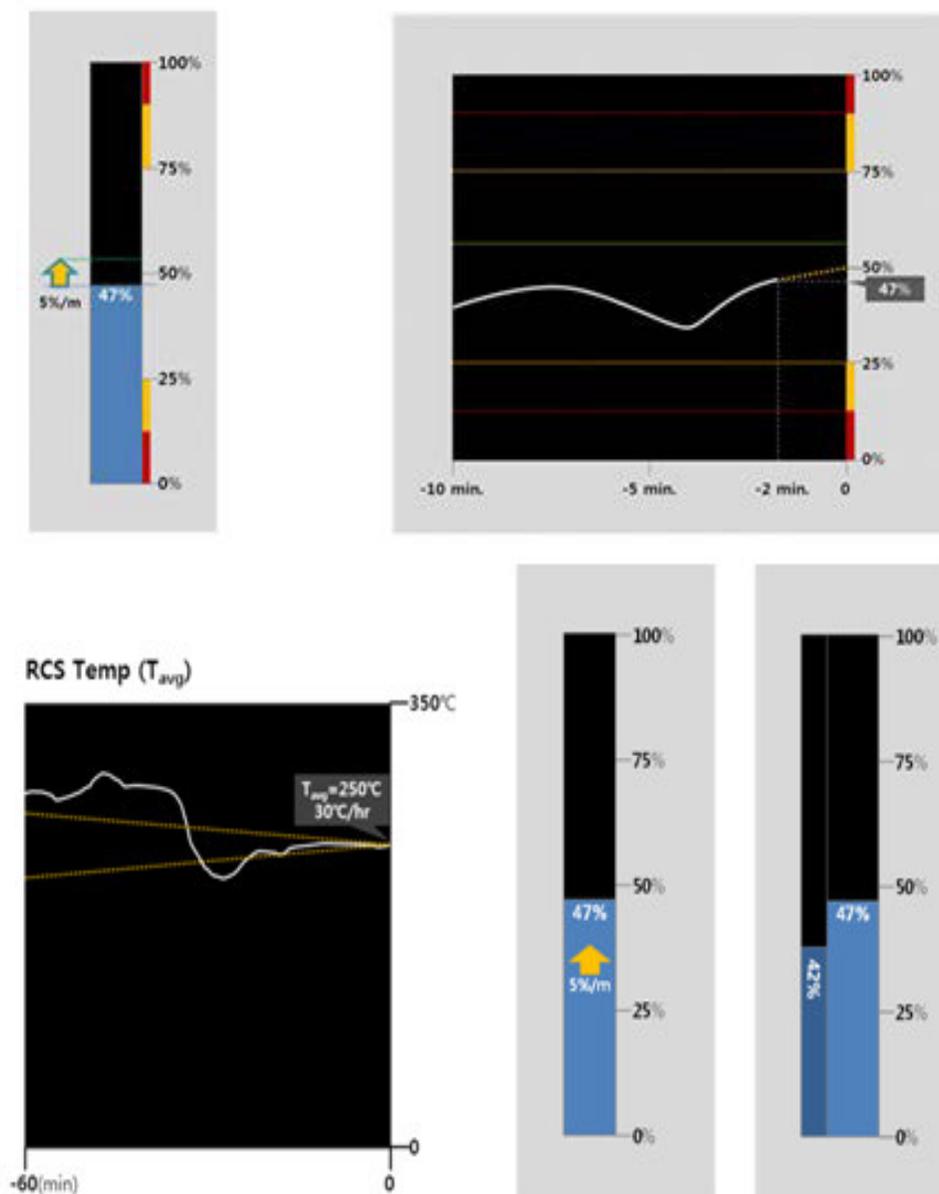


Figure 6: Single Variable Displays

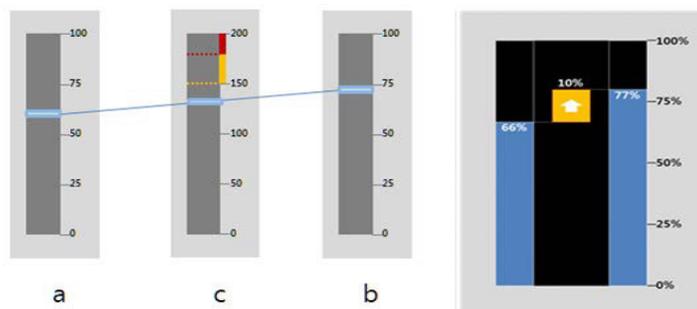


Figure 7: Multiple Variable Displays

**Integrated EID Display**

Conventional displays for SG were surveyed before integrating the EID elements into a comprehensive EID for SG (Figure 8). The conventional displays of SG contained familiar P&ID (piping and instrument diagram) mimics to actual operators and used for comparing with the proposed EID displays.

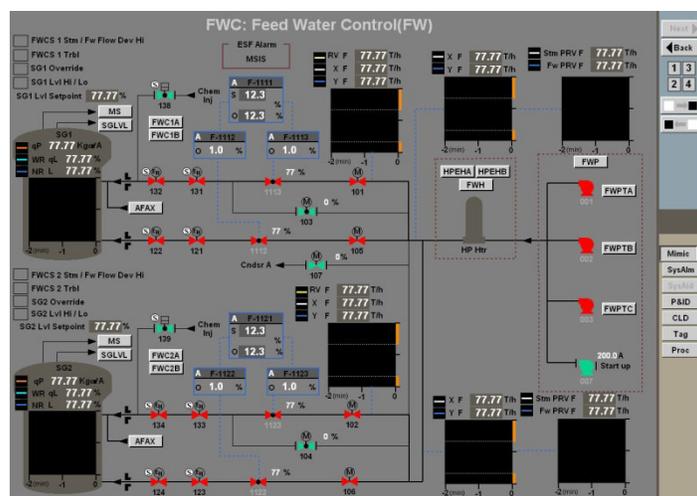


Figure 8: A Conventional Display of Steam Generators (SG)

The proposed SG display was developed based on the elementary EID units and task analysis result (Figure 9). The interface visualizes the abstracted information in relation with its component information, of which relations were obtained from WDA and Hierarchical Task Analysis.

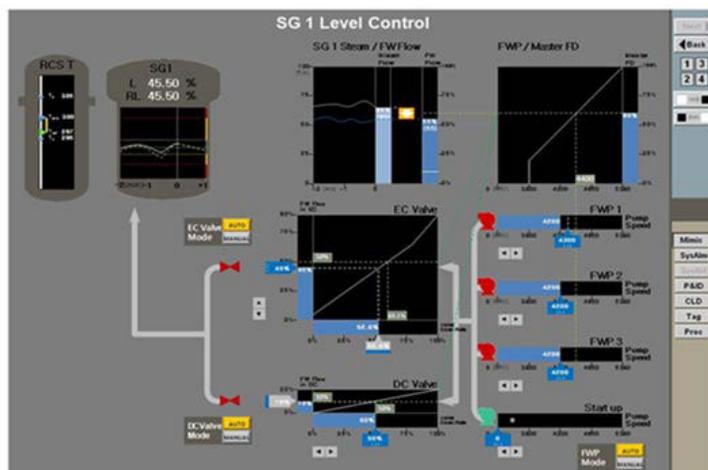


Figure 9: Proposed Example of EID for SG Process

Figure 9 shows an example of integrated EID display for SG control system. The layout implies the flow direction of the feed water (i.e., right to left) and the abstraction levels (i.e., left is higher at the top row). Although the complexity of unit displays is not as high as some typical EID examples and thus the density of information packed in a figure is moderate, the consistent element design for the building components provide easy and comfortable overall display.

### ***EID Display Review and Suggestions***

As the EID example was not developed as a simulation, only a qualitative expert review was conducted. The display was not designed with an aim to replace current display altogether but to be used as a complementary one. One of the reservations was that, in an emergency situation, there would be no guarantee that the surrounding subsystems are all in normal working conditions. The conventional P&ID display would provide overall system architecture to support wide-range diagnosis. However, modern MCRs provide a large main display both in the main panel (Figure 1.) and operators' consoles. Then one of the screens in front of each operator already provides task-oriented displays such as EID as well as system-oriented displays. That is, the EID displays would not replace the overall main schematics or the system-oriented displays of subsystems, but reorganizes the task-oriented displays. Then the question is how the EID displays maintain mental momentum when the operator transit between the EID to system-oriented displays or between different EID displays. In purely system-oriented views, it is relatively easy to support such cognitive momentum since visual momentum naturally warrants it.

Among the suggestions collected, three important points are worth noting. First, to the experts some information is more crucial than the others. The amount of information provided and its salience should be proportional to the informational importance to guide proper attention of the operator. An EID tends to provide too much detailed information so that important information items may be obscured by the numerousness and complexity. This is where the EID designer has to pay extra attention.

Second, highly trained operators are accustomed to get numbers, rather than figures, and control the system using the numbers. To support, exact numbers of important variables should be more conspicuous in the display. This is indeed a subject that EID philosophy dealt with from the first by considering SRK frame, that is skill-based, rule-based, and knowledge-based behaviours. Therefore, it is not a weakness of EID approach but an information requirement to be considered more explicitly.

Third is a problem that is more general in digitalized systems. Soft controls are not as intuitive to handle as their tangible counterparts and tend to cause more errors. How the EID can be combined with the operation controls is a question for the EID designers and a subject that requires further experimental research to make EID practical alternative to conventional displays

## **IV. CONCLUSION**

This study describes the design of consistent and easy-to-integrate EID display units in nuclear power plant domain. There were many research evidences for the cognitive benefits to use EID instead of conventional interface<sup>4-6</sup>. The abstracted information on a cognitive interface may reduce possible mental workload, enhance monitoring and situation awareness, and support diagnosis in a digitalized system environment. It is of a particular interest that EID was reported to improve situation awareness during the monitoring to deal with unanticipated events<sup>6</sup>. With all the benefits suggested in academic studies, the innate complexity and possible inconsistency in representing relationships among variables in visual forms hamper practical implementation of EID in real systems, where safety is usually the utmost concern. This research proposed an design approach to assure the cognitive consistency by first developing elementary EID units in a stepwise manner: from single-variable displays, multiple-variable displays, and then integrating templates.

An exemplar EID design was shown for SG control process in the nuclear power plant. It is intuitive and easy to learn and use. Moreover, the design is extendible to the other subsystems without changing elementary information manifestations and the way they are integrated. As more evidences are collected for the usefulness and robustness of such elements, and as more technical solutions appear to overcome current weaknesses in EID design to complete the cycle of monitoring and control, the benefits of EID will be fully realized in practical systems.

## **ACKNOWLEDGEMENT**

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# Location of Shielding Material and Size of Radiation Field in Radiographic Procedures for Neurocranium Affect Entrance Surface Dose in Major Organs

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## Abstract---

**Background/Objectives:** The purpose of this study was to determine the effect of the location of cylinder thyroid shielding materials and the size of radiation field in radiographic procedures for neurocranium on entrance surface dose in major organs.

**Methods/Statistical Analysis:** Two SID(100cm and 70cm) of DR system with exposure conditions at 76 kVp and 25 mAs were used. ESD was measured by using OSLD and ART phantom with maximum radiation field of and 8 inch x 10 inch. Measurement points included the left, the right, the anterior and the posterior of the thyroid area using thyroid shielding.

**Findings:** The ESD values of maximum field at the back shield were lower (SID 100cm and 70cm: 85.9% and 63.4% lower, respectively) than those at the front shield. For 8 inch x 10 inch field, the ESD values were lower by 64% and 54.3% for SID 100 cm and 70 cm, respectively. The ESD values when the cylinder device was used were lower by 67% and 27.6% for SID 100 cm and 70 cm, respectively. In addition, for SID 100 cm, the orbit ESD with maximum field was the highest (200.62 uSV). Orbit ESD value was lower by 54.4% (91.57 uSV) for a field of 8 inch x 10 inch. It was also lower by 57% (86.28 uSV) when cylinder device was used. For SID of 70 cm, orbit ESD value with the maximum field was the highest (262.18 uSV). It was lower by 28% (188.87 uSV) than that for a field of 8 inch x 10 inch. It was also lower by 64% (94.59 uSV) when the cylinder was used.

**Improvements/Applications:** Using cylinder device and back shielding for the thyroid could reduce ESD in sensitivity organs of patients.

**Keywords---** Cylinder, Shielding Material, ESD, Thyroid, OSLD, SID.

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## **I. INTRODUCTION**

Since its discovery by W. C Roentgen in 1895, X-ray has been used for medical imaging for more than 100 years. It is the most powerful tool for the diagnosis of diseases in medical field.

However, radiation doses in patients have been continuously increasing due to the use of advanced medical devices and the development of medical technology<sup>1</sup>.

Medical radiation exposure is of great interests in terms of technical effort and radiation technologists to reduce radiation exposure to patients.

Although radiation has benefit for diagnosis and treatment, it will also increase the exposure of patient to radiation<sup>2</sup>.

The ALARA concept by ICRP has recommended that optimized image quality should be maintained while reducing radiation dose to ensure the legitimacy of examination during medical imaging<sup>3</sup>.

However, there is a lack of awareness of adjustment for X-ray field size and appreciated radiation dose compared to using film and screen (FS) in the past.

Radiation dose might be increased when field size is larger than the diagnosis area, leading to unnecessary exposure of important organs to radiation which can damage normal organs.

In total of 333 medical institutions, 204(61.3%) are using appropriate field size for each exposure part. While 43(12.9%) and 86(25.8%) institutions are using Partial control and no control, respectively, for the field size.

A total of 129(38.7 %) of the 333 investigated institutions have used inappropriate field size. Moreover, of 117 institutions with DR system, 76 (65.0%) institutions used appropriate field size while 41 (35.0%) used inappropriate field size<sup>4</sup>.

Unnecessary radiation exposure can also arise when X-ray is in collision with materials or when the direction is changed to another place.

Moreover, scattering radiation can affect image quality.

Therefore, appropriate method is needed to protect and reduce scattering radiation during X-ray examination<sup>5</sup>.

To reduce scattering radiation, one of the most general methods is by reducing field size.

The field size has to be always limited by exposure area because reduced field size might increase image contrast and decrease scattering radiation, thus reducing radiation exposure dose to patients<sup>6</sup>.

In examination of microscopic lesions such as PNS, mastoid, and optic foremen, although using a cylinder device can improve image quality and decrease scattering radiation<sup>7</sup>, in reality the use of cylinder device and field size control are ignored due to inconvenience and discomfort for involved in the exchange or control according to exposure legions.

The objective of this study was to measure entrance surface dose (ESD) on the orbit and the thyroid when adjusting the size of radiation field and using a cylinder device during radiographic procedures for neurocranium.

The changes of thyroid ESD values when shielding the front, the back, and both shielding materials were determined.

Results of this study might provide basic data to prepare measures to reduce radiation exposure by adopting effective location of a shielding material with a cylinder device.

## **II. RESEARCH EQUIPMENT AND METHODS**

### **A. Research Equipment**

The X-ray equipment used in this study was Definium 6000 digital radiography system. OSLD nanoDot dosimeter was used to measure ART Phantom (a human body-equivalent material) and dose.

Thyroid Apron (0.5mmPb) was used as a shielding material. In addition, X-ray cylinder device commonly used in clinical trials was used in this study (Figure 1).

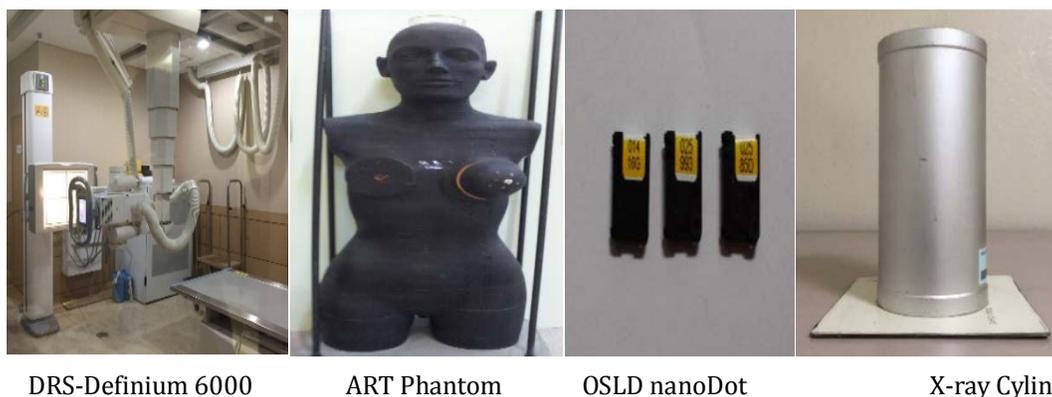


Figure 1: X-ray Equipment

### B. Research Methods

DR system was used to meet the following standard shooting conditions suggested by the Ministry of Food and Drug Safety: tube voltage at 76kVp, tube current at 25mAs, standard distance (SID) at 100cm or 70cm. SID was defined as the distance between the cylinder and the neurocranium. To measure the maximum radiation field, radiation in a field of 8 inch x 10 inch, and ESD values on the thyroid when using a cylinder device, OSLD nanoDot was attached to the right and the left of the thyroid of ART phantom. ESD was measured when shielding the front or the back of the thyroid as well as when shielding both sides simultaneously (Figure 2).



Figure 2: NanoDot was Attached While the Front, Back, and both Front and Back are Shielded with a Shielding Material

## III. STUDY RESULTS

### A. ESD on the thyroid Depends on the Size of Radiation Field and the Location of the Shielding Material in the Case of SID of 100cm

At the maximum radiation field, ESD was lower by 85.9% when shielding the back of the thyroid compared to that when shielding the front of the thyroid. ESD was lower by 64% in the case of radiation field of 8 inch x 10 inch. It was lower by 67% when a cylinder device was used (Table 1).

### B. ESD on the Thyroid Depends on the Size of the Radiation Field and the Location of a SHIELDING Material in the Case of SID of 70cm

At the maximum radiation field, ESD was lower by 63.4% when the back of the thyroid was shielded compared to that when the front of the thyroid was shielded. ESD was lower by 54.3% in the case of radiation field of 8 inch x 10 inch. It was lower by 27.6% when a cylinder device was used (Table 1).

Table 1: Results of Thyroid ESD Values

Unit :uSv

SID	Type	Thyroid Shielding			
		Not	Front	Back	F & B
100 Cm	Full	423.528	292.045	41.219	43.928
	8 inch x10 inch	150.088	104.939	37.692	42.551
	Cylinder	125.653	107.822	35.636	39.628
70 cm	Full	540.860	246.404	90.164	108.401
	8 inch x10 inch	251.893	178.182	81.437	92.050
	Cylinder	69.015	68.151	49.341	57.941

In terms of the decrease in ESD value depending on the size of radiation field and the location of the shielding material, there was statistically significant ( $p < 0.05$ ) difference among the three cases (shielding the front of the thyroid, shielding the back of the thyroid, and shielding both front and the back of the thyroid) (Table 2).

Table 2: Shielding Effect on ESD Values

Shield	Z	p-value
Not- Front	-2.201	0.028
Not-Back	-2.201	0.028
Not-F&B	-2.201	0.028

**C. ESD on the Orbit Depends on the Size of the Radiation field and the Location of the Shielding Material in the Case of SID of 100cm**

ESD was the highest at 200.62 uSv with the maximum radiation field. It was lower by 54.4% in the case of radiation field of 8 inch x 10 inch (at 91.57 uSv). Compared to the ESD value at the maximum radiation field, the ESD was lower by 57% (at 86.28uSv) when a cylinder device was used (Table 3).

Table 3: Results of Orbit ESD Values  
Unit: uSv

SID	Collimation	Orbit
100 Cm	Full	200.62
	8 inch x10 inch	91.57
	Cylinder	86.28

**D. ESD on the Thyroid Depends on the Size of the Radiation Field and the Location of the Shielding Material in the Case of SID of 70cm**

ESD was the highest (at 262.18 uSv) with the maximum radiation field. Compared to the ESD value at the maximum radiation field. ESD was lower by 28% (at 188.87uSv) with radiation field of 8 inch x 10inch. Compared to the ESD value at the maximum radiation field, the ESD value was lower by 64% (at 94.59 uSv) when a cylinder device was used (Table 4).

Table 4: Results of Orbit ESD Values  
Unit :uSv

SID	Collimation	Orbit
70 cm	Full	262.18
	8 inch x10 inch	188.87
	Cylinder	94.59

Statistical analysis was performed using SPSS (ver. 18.0). Wilcoxon signed-ranks test revealed significant ( $p < 0.05$ ) differences among ESD values when the front, the back, and both front and back were shielded according to SID and radiation field size.

#### IV. DISCUSSION

X-ray has been increasing used in the radiation diagnosis field since its first discovery by W. C. Roentgen. However, there is a lack of understanding for the control of radiation field size, appropriate adequate radiation dose, and scattering dose when using it in medical imaging field. The DR system has been universally used due to the recent development in modern medicine. However, the lack of understanding on radiation field size could increase radiation exposure dose to patients when radiation field size is increased. Using unnecessary large field size has increased radiation dose to patients, leading to damages to sensitive normal organs in practice.

A previous study has reported that the basic method for reducing radiation dose to patients is by decreasing radiation field size and sparing patient skin to reduce scattering dose and improve image contrast<sup>8</sup>.

For facial bone, the manual method with consistent condition could decrease radiation dose for the lens and thyroid by decreasing the size of radiation field. Using the automatic control radiation (ACR) mode to decrease field size can decrease radiation dose to the thyroid. However, radiation dose received by the lens is increased<sup>9</sup>.

Therefore, appropriate manual method should be used to adjust the radiation condition and control the size of radiation field size to reduce the radiation exposure dose and decrease the scatter effect on the lens and thyroid.

In our study, ACR system was not applied. The sizes of radiation field used in this study were the maximum and a field of 8 inch x 10 inch. We used two SID values: 100 cm and 70 cm. We also determined the effect of cylinder device use on ESD values. Our results showed that the ESD value for lens was the highest at the maximum radiation field. The ESD value was lowered by 55% when radiation field of 8 inch x 10 inch was used and by 28% when a cylinder device was used. In addition, the ESD value was lowered by 57% and 64% when SID value was 100 cm and 70 cm, respectively. For the thyroid, the ESD value was lower in conditions that maximum field size, 8 inch x 10 inch, and used the cylinder.

Kim et al<sup>10</sup>. Have evaluated whether the use of water filter could reduce radiation exposure while improving image quality. Similar study has been performed to determine whether the use of echo-bismuth material could shield the thyroid and reduce radiation exposure<sup>11</sup>. However, our study only used lead shield material and evaluated it under various conditions.

In addition, Park et al<sup>12</sup>. have reported that using SID at 130 cm could reducing expands of the image. In our study, SID at 100 cm and 70 cm, the SID of standard exposure method for the neurocranium area, were used.

In addition, the effect of shielding location for the thyroid with a cylinder device on radiation dose during neurocranium was evaluated. In PNS water's exposure, the ESD value by shielding the thyroid in both the anterior and posterior directions were lowered by 67% and 27.6% for SID at 100 cm and 70 cm, respectively. Compared to the ESD value when only the anterior direction of thyroid was shielded.

This study had some limitations. First, we did not apply 37 degrees for the PNS water's method because ART phantom and OSLD nanoDot measurement could only use one element. Future study will be needed to evaluate the effect of reducing exposure angle while using ART phantom and various shielding materials on radiation dose. In addition, comparison between OSLD and TLD measurement tools is needed to determine their effect in reducing radiation exposure.

#### V. CONCLUSION

ESD values of orbit were measured to determine the effect of radiation field size, the used of cylinder devices, and the location of shielding position during neurocranium on radiation exposure reduction.

We used ART phantom, an equivalent human tissue, and established the optimum conditions (76 kVp, 25 mAs, 320 mA and 100 cm of SID). The ESD value was then measured at 70 cm of SID. The results for ESD measurement are as follows.

We have changed these parameters that the field size with 100 cm of SID and location of shielding materials, and selected maximum field size. The ESD value when the back of the thyroid was shielded was

smaller by 85.9% than that when the front of the thyroid was shielded. Moreover, the ESD values with radiation field of 8 inch x 10 inch and the use of cylinder device were smaller by 64% and 67%, respectively.

Also, we have changed these parameters that the field size with 70 cm of SID and location of shielding materials, and selected maximum field size. The ESD value when the back of the thyroid was shielded was smaller by 63.4% than that when the front of the thyroid was shielded. Moreover, the ESD values with radiation field of 8 inch x 10 inch and the use of cylinder device were smaller by 54.3% and 27.6%, respectively.

We demonstrated that back shielding of the thyroid was more effective than front shielding and both front and back shielding in reducing the ESD values.

The ESD value with the maximum field size (41.0cm x 41.0 cm) at SID of 100 cm was higher than as 200.62 uSv. At radiation field of 8inch x 10inch, the ESD value was smaller by 54.4% (ESD=91.57 uSv) than that at maximum field size. With the use of cylinder device, the ESD value (86.28uSv) was smaller than that at the maximum field size by 57%. Moreover, with SID of 70 cm, the ESD at maximum field size was 262.18 uSv, which was higher by 28% than that (188.87 uSv) at radiation field size of 8 inch x 10inch field size. With the use of cylinder device, the ESD value (94.59 uSv) was smaller by 64% than that at the maximum field size of radiation.

In summary, the use the cylinder device in DR system greatly decreased the ESD values of orbit and thyroid. Therefore, to reduce radiation exposure dose in patients, back shielding of thyroid and the use of cylinder device are recommended when performing medical imaging for sensitive regions.

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## A Survey to Activate the Design Right in the Korean Jewelry Industry

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### Abstract---

**Background/Objectives:** The management of design right which has been recently started from large companies and then gradually giving influence on small companies, has become an important trend of Korean management nowadays.

**Methods/Statistical Analysis:** Jewelry industry in South Korea is in a recession. Hence, the company's new management strategy is needed to get out of it. Compared to other industries in Korea, jewelry industry has been small and conserved until now. Also, new management strategies using the design right are required in the jewelry industry, since it gets a number of influence of the industrial design. We conducted 100 people of questionnaires and analyzed the correlation through basic statistics, conditional probability using SPSS.

**Findings:** This study aims to investigate and analyses awareness of the current workers and the students on the design right and the management in order to use the design right as a management strategy of the jewelry industry. In response to the question whether active registration of the design right for the company profit is necessary or not, both the current workers and college students positively answered. And in the results of examining the current status of design rights possessed by a representative jewelry company in Korea, the foreign company concentrated on trademark rights while the domestic company focused on design rights and trademark rights. However, they did not directly use or cope with them As a result, both the workers and the students are aware that the design right is important but they are not fully aware of the design management. Educating intellectual property right with design is necessary to strengthen the design right in the jewelry industry.

**Improvements/ Applications:** Further research of applying the role and function of the design right in the jewelry industry to the design management is remained to investigate.

**Keywords---** Jewelry Industry, Design Rights, Design Management, Awareness Survey.

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Special Issue on "Science and Management"

## **I. INTRODUCTION**

### **A. Research Objective and Backgrounds**

Companies are operated by management. As the first step of achieving profits and development, the advancement of company management is very important. Such an essential management is operated on the basis of its own flow. The design management which has been recently started from large companies and then gradually giving influence on small companies has become an important trend of Korean management nowadays. The design management aiming to protect and form companies' unique individuality instead of the existing consumption strategic management only for profits, is giving huge influence on the management trend of the overall industry in Korea. Especially, because of the patent lawsuits between Apple and Samsung, the intellectual property rights have been rising as a new power to companies. Therefore, the jewelry industry of Korea would be necessary to have the management strategic measures to be able to adapt itself to the management changes of other industries. Especially, in the jewelry industry, designs mean the competitiveness, so that it is required to strengthen the cognition of design rights. However, so far, there have been no researches on the patent management in the jewelry industry, specifically, management methods to use design rights. Compared to other industries, the jewelry industry of Korea is small and closed, which can just accelerate the stagnation of the current jewelry industry. Therefore, the researcher selected the use of design rights which are the center of the jewelry industry as changes in the management method, to solve the stagnation of the jewelry industry of Korea and also to develop into a high value-added industry. In other words, this study aims to suggest the measures to enhance the cognition of design rights by students and people engaged in the jewelry industry, and also to use design rights accurately in the jewelry industry.

### **B. Research Methods and Scope Materials and Methods**

In order to apply design rights as the management method to the overall jewelry industry, it aims to perform the methods like below.

First, the preceding research is conducted on papers related to management methods and design rights in the jewelry industry while the current management status of the jewelry industry of Korea is examined.

Second, the current status of possessing design rights in the jewelry industry of Korea is limited to two domestic/foreign representative businesses to research and compare them.

Third, in order to understand the accurate current status, the current status of cognizing design rights was surveyed targeting around total 100 people including 30-50 students and 30-50 personnel engaged in the jewelry industry. The questions of the questionnaire were limited to less than 20 questions with five kinds of responses.

Fourth, the collected questionnaires were analyzed through the SPSS statistical program, and the measures to use design rights in the jewelry industry were suggested.

## **II. THEORETICAL BACKGROUND**

### **A. Definition of Design Right**

Design right is intangible property right to protect human intellectual creation. It is divided into industrial property right and copyright at a high level. Industrial property right is protected only after the review by and registration with the Korean Intellectual Property Office and maintained for 10~20 years thereafter. Design right belongs to the industrial property right and covers appearance design based on the form, shape, and color of an article. Articles with aesthetic exterior differentiated from the existing products can be patented under design right.

Design right is protected for 15 years from the date of design right registration.<sup>1</sup> Design has emerged as a key area of business management in modern society. Good designs provide multiple benefits to enterprises and uniquely and distinctively designed new products stand out among rival products. In addition, by instantly informing consumers of the product value, designs guide consumers' reasonable purchase decision and help them enjoy using products easily.<sup>2</sup> In this sense, the significance of design right has enhanced continuously.

### **B. The Current Status of the Jewelry Industry of Korea**

According to the business survey by the National Statistical Office, the number of national jewelry businesses was total 15,169 in 2013, which has been decreased 1.1% compared to the previous year. In each business type, the number of manufacturing business was 1,462, which was increased 7.2% than the previous year. In case of the wholesale business(2,364), it was similar to the previous year. On the other hand, the number of retail business was 11,343, which was decreased 2.4% compared to the previous year.

The domestic jewelry market size of 2014 was 5876.9 billion won, which was increased 18.4% than the previous year. The jewelry market of Korea is divided into the non-wedding present market and wedding present market. The non-wedding present market is estimated as 4306.4 billion won while the wedding present market is 1570.5 billion won. The wedding present market forming comparatively stable market was decreased 2.1% than the previous year while the non-wedding present market was 28.2% increased, leading the rise of the whole market. Rather than the direct growth of the domestic market, however, it is the result of the expanded fashion jewelry market as the area of traditional materials (jewels and raw materials like gold and silver) has faced the limitation. It is also the market including the continuous sales increase of imported brands and imports of finished jewelry products. Considering the actual business of the market and the market size compared to the previous year, around 800 billion-1,000 billion won(18-23% of non-wedding present market) is estimated as this market.<sup>3</sup>

### **C. Characteristics of the South Korean Jewelry Market**

The South Korean jewelry market can be characterized to have four major characteristics.

First, businesses are transferred to descendant. The South Korean jewelry market has family-centered business management type. In the jewelry industry, family succession of jewelry brand started in the 1990s at the introduction of overseas luxury jewelry brand names. As existing Korean firms realized the significance of brand awareness, they began to develop own brand images, brand marketing and brand identities. While maintaining their corporate identity, these firms transferred the management and ownership to the second generation through inheritance and giving in order to maintain the business by teaching own private knowhow. In addition to this, the sense of responsibility as members of the same family was also supportive to produce sustainable corporate growth and management performance. After succession, therefore, companies are highly likely to grow further. To explore ways to stimulate business succession in South Korean jewelry brand names, Se-yeon Noh investigated the relationship between factors necessary for business succession and its accompanied performance factors and found that, among the management factors, design management had a larger effect on corporate performance. Noh argued for the significance of investing in corporate design development.<sup>4</sup>

Second, the market functions around wedding presents. The wedding present segment has the largest effect on the formation of South Korean jewelry market. The wedding gift market segment does not require fast design changes and diversified materials and structures, showing a stable market scope. The South Korean luxury jewelry market, in particular, was EUR 8.3 billion in 2013 and, of it EUR 6.2 billion is wedding jewelry market. Despite the sluggish national economy, the luxury wedding jewelry sales increased,<sup>5</sup> proving that the market functions around wedding presents once again.

Third, the market is shifting from small retailers toward large-scale franchise shops. From 1995 to present, the South Korean jewelry market has been through stagnation and preparation for another leap forward. During this period, large franchise brand names entered the scene such as MiniGold in 1996; System G in 1997; Juliet, Easy gold in 1998; and Gold click and jewelry in 1999 began to expand shops under franchise based on memberships shop marketing. After the national foreign exchange crisis in December 1997, franchise shops were expanded in full scale. Of the 18,000 retail shops, about 8,000 closed doors and the void was filled in by large franchise brand shops. Such shops have shown 20~50% growth each year until 2014.<sup>6</sup>

Forth, consumer awareness changes. In the past, the jewelry industry used not to be closely related to daily necessity consumption. It was a high value added business for decorative purposes and was regarded as a major luxury item. However, jewelry in the modern society, functions not only for economic purposes but also for psychological, social and cultural purposes. Jewelry plays a big role as a medium to communicate and

emotionally sympathize with other people, and express oneself. In this situation, public awareness on jewelry consumption has changed gradually. Presently the jewelry market implies the idea of contemporary jewelry.<sup>7</sup>

Contemporary jewelry here means modern jewelry referring to all kinds of jewelry produced and worn in this contemporary period.<sup>8</sup> Jun-Ah Han argues that in order to change consumers' awareness on contemporary jewelry, not only the commercial value of jewelry but also its design value should be established and, in order to trigger consumers' consumption sentiment, jewelry should have sufficient social values based on diversified marketing activities and brand strategies in addition to product sales.<sup>9</sup>

**D. Current status of Jewelry Design Right Protection**

Nations over the world realized the significance of design and has considerably invested in design development along with technology development. As for South Korea, due to the aftermath of the 1997 foreign exchange crises, design right requests and registrations fell then rebounded in 1998 and has increased constantly since 1999.<sup>10</sup>

In this situation, this paper looked in company cases of Tiffany<sup>11</sup>, a main wedding jewelry company in the domestic market, and Golden Dew<sup>12</sup>, a Korean traditional family succeeded company <Table1> As for the intellectual property right holding, the two firms were found to have more trademark rights and design rights than patents. <Table2>

Table 1: Comparison of Representative Businesses

Brand Name	Tiffany & Co.	Golden Dew Co., Ltd
Brand Nationality	US	Korea
Founder	Charles Louis Tiffany, John Burnet Young	Lee, Geon Gap
Foundation Year	1837	1982
Total Sales	\$ 4,249,913,000 (4832.1 billion won)	10.67 billion won
No. of Full-Time Employee	1,200	197
No. of Offline Shop	295	80

Table 2: The Current Status of the Representative Jewelry Businesses' Possessing Intellectual Property Rights

Brand Name	Tiffany & Co.	Golden Dew Co., Ltd
Legal Protection	TM use, trademark rights	Design registration
Possessed Patents	None	None(5cases extinguished)
Others	Trademark application: 8cases Trademark registration: 122cases Trademark rejection: 9cases	Design registration: 103cases Design extinction: 154cases Design rejection: 66cases Design withdrawal: 1case Design abandonment: 2cases

**III. DESIGN RIGHT AWARENESS IN THE JEWELRY INDUSTRY**

**A. Survey Significance**

Preceding study showed that the national jewelry market has been in long stagnation due to the exclusive management style and has not been very active regarding design right protection despite the growing significance of designs. In this situation, in order to expand the possibility of aggressive profit generation by combining design management into jewelry market, the researcher of the present surveyed office workers presently in the jewelry industry and students at jewelry-related departments. By doing so, this study seeks to examine the status quo of present design right awareness as well as future educational direction for design management.

**B. Investigation and Experiment Design**

To objectify the design right and design management of jewelry industry, survey investigation was utilized in this study. Survey targets were present office workers and students of jewelry-related departments in their 20s to 50s.

Given the nature of jewelry market, office workers at companies perform application for design right in terms of business management and jewelry-related department students, if they have no school education, would experience lower design rights. For this reason, the two groups would have differences in awareness levels. The nonprobability sampling method of convenient sampling was employed herein where a researcher samples from easily approachable members. The survey was conducted for 100 male and female students and workers in the jewelry sector.

**C. Survey Structure**

Survey questionnaire should be prepared in a manner to easily standardize. In general, to prevent errors and acquire necessary information comprehensively, survey is consisted of 5 elements – request for respondents’ cooperation, identification data, indications, survey questions and data for respondent classification.<sup>13</sup>

Survey should be continuously improved and complemented in each set stage every time a problem is spotted in each stage with a view to identify necessary information and gain data for research agenda resolution. Also, once the necessary information is acquired for study resolution, the relevant questions should be specifically determined.

**D. Survey Questions and Result Analysis**

The survey respondents are relevant industry employees and jewelry-related department students. Of them, male workers accounted for 58%, female workers, 42%; and male students, 20%; and female students, 80%. All of the surveyed college students were in their 20s. <Figure 1>

Table 3: Awareness Survey-1

Questions	Answer(%)		
	choices	Actual worker	Student
1. Mark on your sex	male	58	20
	female	42	80
2. Mark on your age	20's	6	100
	30's	86	-
	40's	8	-
	50's	-	-

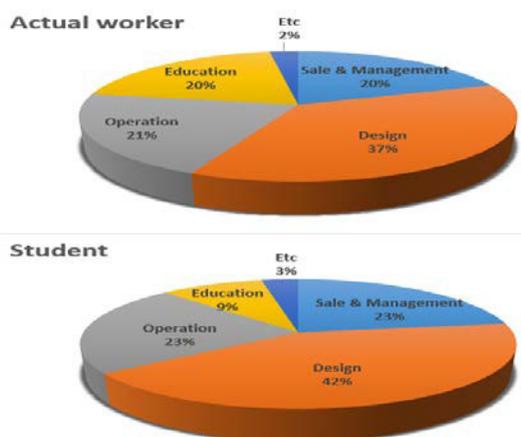


Figure 1: Actual Worker-Job & Student-Hope Occupation

As for their current work or desired work after school graduation, 60% of both the present workers and college students answered design. The present workers said they want management planning and marketing, sales and management, education and others in order. College students answered they wanted sales and management and management planning marketing at the same ranking followed by education and others. <Table 3>

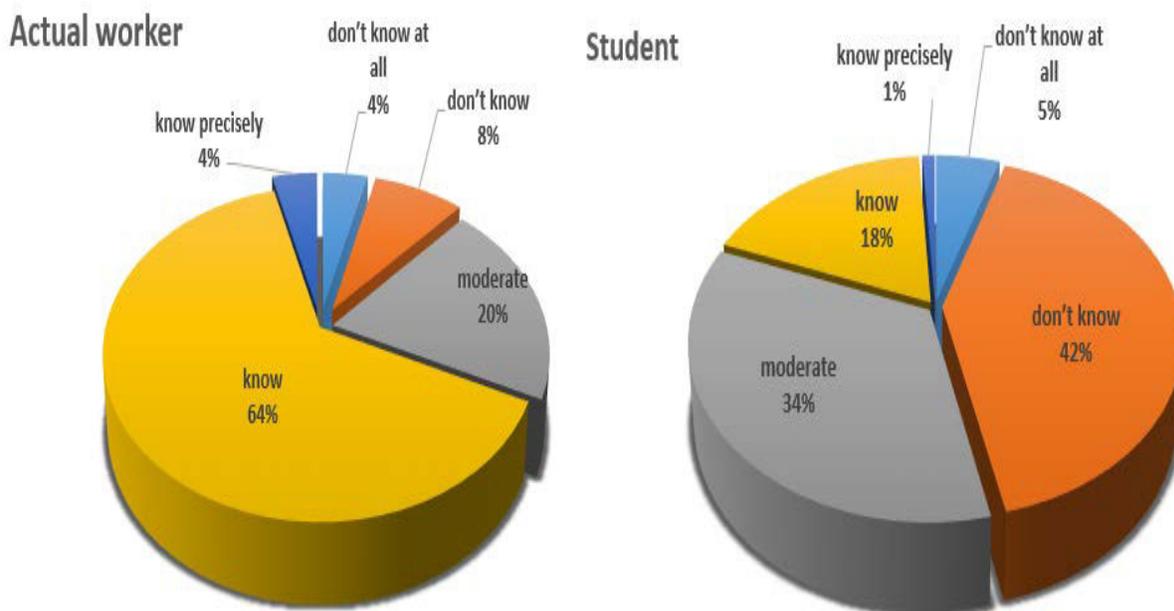


Figure 2: IPR Awareness

The questions asking the basic understanding of intellectual property right, patent and trademarks are as follows;

As for intellectual property right, 88% of the present workers said they had been aware of it whereas 53.5% of the college students said they had known. As for the rights under patent, 80% of the present workers and 62.2% of college students said they had known.

Concerning trademark right and design right, 88% of the present workers said they had known and 60~51% of college students said so, indicating that present workers had a higher level of awareness on the basic idea of intellectual property right.

Regarding the routes to be informed of design right, the present workers said they did so via the internet and SNS whereas college students gained such information at school or private institutions. Over 64% of the present workers said they had applied for a patent. And of them 64% said they had applied for patent once and over. 16% of the college students said they had applied for a patent and 15% said they had done so once and over, lower than those of the office workers. <Figure 2>

To questions asking the importance of design right in design as well as the necessity for design right education, at least 96% of both present workers and college students said that design right was important in designing and over 97% of them answered they had felt the need for design right. < Table 4>

Regarding the awareness on design management, 20.4% of the present workers and only 30% of college students answered they had known about it, showing a considerably lower level of awareness compared to that of design right.

However, as for patent lawsuit, 98% of the present workers and 97% of college students said they had known. Over 91.5% of present workers and 95% college students said yes to the question asking if design right is an important means in patent lawsuits. < Table 5>

Table 4: Awareness Survey-2

Questions	Answer(%)		
	choices	Actual worker	Student
12. Do you think the design right is important for designing	not at all	4	2
	no	-	1
	moderate	30	10
	yes	52	57
	yes entirely	14	30
13. Do you think it is necessary to have education about design rights for designing	not at all	-	1
	no	2.1	2
	moderate	12.5	13
	yes	62.5	56
	yes entirely	22.9	28

Table 5: Awareness Survey-3

Questions	Answer(%)		
	choices	Actual worker	Student
14. Have you ever heard about the design management	yes	20.4	30
	no	79.6	70
15. Have you ever heard about the recent design patent right lawsuit(Apple vs Samsung, Tiffany vs Swatch and etc.)	yes	98	87
	no	2	13
16. Do you think the design right is an important defensive measure in the patent lawsuit	yes	91.7	95
	no	8.3	5

In response to the question whether active registration of the design right for the company profit is necessary or not, both the current workers and college students positively answered. However, 40 percentage of the workers and 20 percentage of the students negatively answered about the question whether the company or the institutes should encourage registering the design right. In addition to the question of whether accounting is an important factor in the design aspects of corporate management, 69.4 percentage of the present workers and 78 percentage of the students responded as they are important. < Table 6>

Table 6: Awareness Survey-4

Questions	Answer(%)		
	choices	Actual worker	Student
17. Do you think it is needed to have active registration of design rights for the profits of companies	not at all	-	-
	no	-	1
	moderate	42	16.3
	yes	32	56.1
	yes entirely	26	26.5
18. Do you recommend the registration of design rights at company or school	not at all	16	1
	no	24	19
	moderate	34	55
	yes	16	21
	yes entirely	10	4
19. Do you think design is an essential element in the aspect of corporate management	not at all	-	-
	no	-	2
	moderate	30.6	20
	yes	30.6	57
	yes entirely	38.8	21

Based on the fact of, there was no significance between the present workers' recognition about the design right and experience of the design management after analysing correlation between the design right and the design management. Moreover, the student's recognition about the design right and experience in the design management did not show significance either.

Collectively, there was no correlation between the present workers' and the students' recognition about the design right, and the design management. Thus, it is essential to educate both the workers and the students about the design right with knowledge of the design management. <Table7>

Table 7: Association Analysis

(p-value)		Actual worker	Student
Design rights are important	know the Design Management	.901	.351
	Don't know the Design Management	.694	.227
Design right isn't important	know the Design Management	.668	.542
	Don't know the Design Management	.288	.841

Table 8: Conditional Probability

(%)		Actual worker	Student
Design rights are important	know the Design Management	84.21	78.57
	Don't know the Design Management	72.29	83.33
Design right isn't important	know the Design Management	15.78	21.43
	Don't know the Design Management	27.70	16.67

Regarding the result of conditional probabilities on the importance of the design right and awareness of the design management, it was 84.21% of the present workers understanding the design management and the importance of the design right, and 15.78% of those who did not think that the design right is critical but understood the design management. For the students, there were similar trend as the workers indicating no correlation between the design right and the design management. <Table8>

#### IV. CONCLUSION

This study aimed to suggest the measures to apply design rights as a way of corporate management and also solving the stagnation of the jewelry industry of Korea. In the results of examining the current status of design rights possessed by a representative jewelry company in Korea, the foreign company concentrated on trademark rights while the domestic company focused on design rights and trademark rights. The patent did not have much influence. Also, in the results of surveying the cognition of design rights targeting preservice people and also people currently engaged in the jewelry industry, overall, the people currently engaged in the industry have known more about the intellectual property rights and design rights than preservice people. However, they did not directly use or cope with them. It can be estimated that people have high awareness on patent, trademark right and design right and regard those very importantly. However, they have low awareness on design management, implying less active design management in the South Korean jewelry industry.

Also, although both the workers and the students understood the importance of the design right, they were not entirely aware of the design management. Thus, educating them with the design management should be prioritized. Education of intellectual property rights with design and understanding these are necessary. Using the role and function of the design right in the jewelry industry, the research on how to apply these to the design management should be continuously performed.

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## An Empirical Study on the Prospects of Online Marketing Strategy for Promotion of Granite Products in Tamilnadu

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### Abstract---

This article aims to discuss the optimal nature of corporate websites for B2B (Business to Business) marketing especially in granite industries of Tamilnadu. One of the objectives of this study is to suggest other research opportunities from an Internet survey of people working in granite companies. This study shows that granite business websites should be evaluated not only at the awareness stage but also at the exploration stage. In addition, it is necessary that granite corporate websites not only contain detailed information about products and services, but also information on management strategies (business strategy information, IR, CSR, etc.). It is suggested that a balance is needed between the two types of information in corporate websites for granite products. The scores of data analysis shows that even though online marketing can be added in the promotion efforts of granite products, it has to be added with caution. The characteristics of customers of B2B companies like granite industries have to be considered in online marketing efforts.

**Keywords---** Online Marketing, Granite, Website, B2B, E-Commerce.

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## **I. INTRODUCTION**

As the technology based information environment using Internet has progressed, B2B business (business to business for companies) transaction structure in granite industries has also been changed. Due to the progress of information technology, dynamic change in economic organization with the increasing speed with which markets and products are reinvented, The sources of disequilibrium and the path between equilibrium is plainly correct. Transaction cost economics is especially well suited to this inquiry. From a transaction cost perspective, analysis begins with the economy in organizational equilibrium (Picot, Ripperger and Wolff, 1996). As Inoue (2002) also argues, B2B companies like granite industries are not confirmed trading partners in closed affiliate markets alone, they are seeking a wider range of counterparties, increasing their absolute numbers but also technology are trying to build a continuous relationship by exchanging information.

According to the Ministry of Economy, with \$681 billion in online retail sales in 2016, China is the largest market for e-commerce globally, followed by the US, and the fastest growing one is India. Although the e-commerce of B2B companies like granite industries has become such a large market size. Deloitte is privileged to collaborate with the Confederation of Indian Industry (CII) as a Knowledge Partner to create this report that will be recognized as a repository on the Indian e-commerce industry. In their report, they have presented the point of view of major stakeholders in the Indian e-commerce industry, along with the key challenges faced by them and key recommendations that will help strengthen this nascent industry to scale and sustain. E-commerce has transformed the way business is done in India. With attractive and convenient shopping options at the core of the consumer facing business, the e-commerce industry offers the power to create innovative, sustainable, consistent and seamless shopping experience across all channels.

Against this backdrop, in this research we will focus on the possibility of setting up corporate websites, among various measures concerning the marketing strategy of B2B companies. The purpose of this research is to confirm the present situation of the use of corporate websites in B2B companies like granite industries and to examine the way of building website in such Company's marketing strategy based on the current situation and obtain suggestions for future research. At what stage of the purchasing process the corporate website is utilized? In comparison with the B2C market, Kotler & Keller (2006) points out the characteristics of the B2B market like granite sector as compared to the B2C market, it is necessary to deal with a small number of large purchasers, to have close relationships between suppliers and customers, purchase by professionally trained purchasing personnel, purchasing policies, constraints, Being done according to requirements, having multiple purchasing influencers, and requiring multiple business visits. The following characteristics are to be considered in B2B marketing.

### ***Multiple Decision Makers***

In B2B, there is often four or more decision makers involved in the purchase process. In practice, this may require multiple user roles in the checkout /cart process with multiple stages taking many days (or weeks).

### ***Longer Decision Cycle***

The B2B buying cycle is much longer than for B2C – so the lead time between initial contact and receiving any payment are longer. But also, customer expectation is different- wanting to change exact details of the order through the process.

### ***Customer Specific Discounts***

In B2B, the variations in price lists, discounts, and even available products are generally more complex than for B2C. This is historical. Whether necessary is not the appropriate question when building a B2B ecommerce solution as this is usually a fixed requirement in all but the smallest businesses.

### ***Conflict with Direct Sales Channels***

Many B2B businesses have an established sales team who will be unhappy with online competition that can be seen to decrease their performance bonus. Careful thought must be given to how this is introduced.

### ***International Markets***

B2B ecommerce is often used as a way of reaching international markets, maybe in small numbers. Regulations, legal and cultural issues can cause more of an impact than for B2B ecommerce and this impact is exaggerated if products are small in number and high in value. Decision-making is on the basic characteristics of B2B business from purchasing participants in the B2B business to multi-tier, from site personnel to

management. The number of B2B business customers is limited, not as many as the B2C business. It points out the characteristics those customers of B2B business purchase to procure what is necessary for their own production activities rather than consuming them.

In other words, the biggest characteristic of the B2B business is that an organizational decision will be made. We purchase to procure what we need for our own production process, so various levels of people are involved in decision making and have to go through a theoretical and complex decision making process. That is why in the B2B business like granite industries, we need an excellent sales representative who understands the needs of each customer and can provide optimal goods and services. In order to acquire customers, expand sales channels, and improve performance, the competence of sales representatives is important. However, it is not possible to acquire customers with the skill of sales representatives alone. It is inefficient even if there are superior sales representatives just by jumping into businesses by sales personnel simply by jumping into businesses.

## **II. REVIEW OF LITERATURE**

In order to make inefficiency more efficient, Klanac (2009) argues that communication on the corporate website should be taken into consideration in accordance with 3 stages of building relationships with customers in the B2B business. The three stages mentioned here are three stages of awareness stage (Awareness), search stage (Exploration), commissioning stage (Commitment). In the B2B business, in the purchasing process, such a three-stage hierarchical structure while keeping in mind that there are, it is necessary to strengthen communication on the corporate website. A survey conducted on the point of contact of purchasing participants' communication in the B2B business, "contacts that made a chance to introduce the latest recently", "companies that the examiner wants to consider as a candidate at the next guidance", "Contact point with information about the information device of the reviewer" and classified it into three purchasing processes and asked for contacts for communication, but at any stage as the point of communication with companies, "manufacturer's home page" is on the top, corporate websites play an important role in marketing and communication. However, it has been pointed out that corporate websites are important for marketing and communication; there is no targeted research on corporate websites themselves. It does not show what kind of emphasis the corporate website actually is and how much it is important, it is a part of this research.

Does corporate strategy information emphasize on corporate website? In order to support the marketing activities of B2B companies, information on their products should be enriched on the corporate website. However, now that everyone from the world can easily access the corporate website through the Internet, various stakeholders can touch corporate information, and even B2B companies, even for B2B companies, it is possible for stakeholders other than business partners is also considered. It is necessary to provide various corporate information in the websites. Many companies also provide corporate strategy information (defined here as information related to corporate strategy such as management strategy, IR, CSR, etc. here) not directly related to sales of products. Wanderley et al. (2008) also found that corporate websites can inform stakeholders at low cost CSR. It is one of the most effective tools that can provide information quickly. The degree of satisfaction is based on the degree of satisfaction, and the degree of satisfaction is the ratio of the access rate (the percentage of people who accessed for business purposes in the target, but within the past year) and the needs satisfaction rate (ratio of needs-). For corporate websites of B2B companies, corporate strategy information may not be relevant to the needs satisfaction level. Among the information provided on the corporate website, how much importance is placed on corporate strategy information to business partners? In this research, we would like to discuss the degree of emphasis on business strategy information of business partner companies on corporate website of suppliers.

## **III. RESEARCH METHODOLOGY**

The study is Descriptive in nature and uses a survey method. Both primary and secondary data are used. Sampling is done by simple random sampling and in order to examine the way of website in B2B business, preliminary consideration by using questionnaire survey for B2B company employees is used. By conducting screening of the target persons, three preliminary survey items are used. Things are (1) type of business, (2) Type of operation (B2B) and (3) Information available on the Internet. As a result, the number of valid response samples is 384 employees of granite industries. The main basic attributes of the sample are as follows. The capital of the company to which the respondent belongs is 27.3% for "More than 100 Crores",

then 21.1% for "less than 100 Crores to 30Crores", and "19.5% in order of 30Crores ~ less than 1Crore", and there were many respondents belonging to the relatively large enterprise. In addition, the position of respondents' positions was the largest among "general employees" (41.4%), followed by "chief class" (16.9%), "Manager section class" (15.9%). Also, "management and officers" is 7%.

#### IV. RESULTS AND DISCUSSION

Regarding utilization stage of corporate website, with emphasis to the stage of information utilization of business partner companies on the Internet in the purchasing process of B2B business, "You are a business customer, When do you use the information on the Internet about customers and suppliers the most at what stage?". The information on the Internet about business partners is asked, not just information on corporate websites.

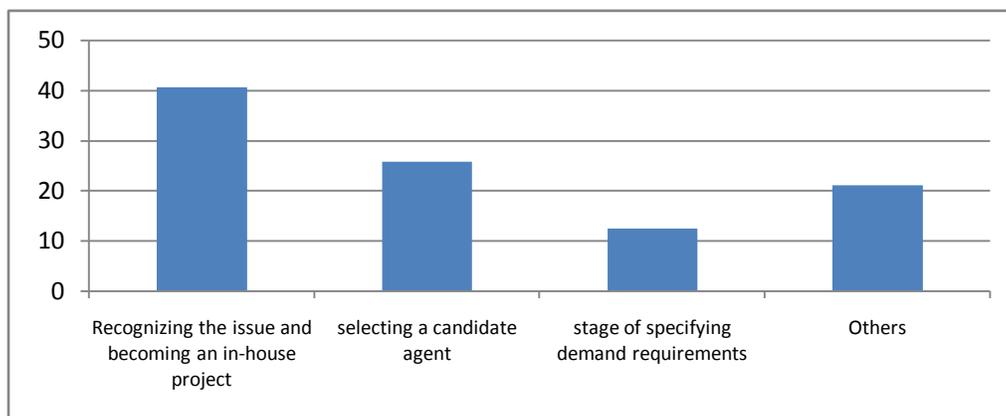


Chart 1: Use Stage of Information on Business Partner Company

The results of the survey are shown in above chart. "Recognizing the issue and becoming an in-house project" was the most frequent, (40.01%) followed by "selecting a candidate agent" (25.8%), "stage of specifying demand requirements" (12.5%) in this order. In terms of the three stages of establishing relationships with customers pointed out by Klanac (2009), the phrases "recognizing tasks and becoming projects in-house" and "stage of specifying requirements for demand" are noticed phases, "candidates The stage of selecting a trader to become a candidate "," stage of requesting a proposal to a candidate merchandiser "," stage of evaluating a proposal and selecting a client "is a search stage, a step of" It is said that it is the consignment stage.

Table 1: Internet Utilization Stage of Business Partner Company Information

	Recognizing the task within the company	Step of specifying requirements of demand	Step of selecting merchant	Requesting suggestions	Evaluating the proposal /selecting suppliers	Turning internal inquiries	Others
Overall (n = 384)	40.6	12.5	25.8	6.5	7.6	3.1	3.9
Management and executive officers (n = 45)	40	11.1	22.2	4.4	20	0	2.2
Department manager class (n = 39)	48.7	2.6	30.8	7.7	7.7	2.6	0
Section manager class (n = 61)	41	9.8	34.4	9.8	3.3	1.6	0
Chief and chief class (n = 65)	41.5	16.9	23.1	6.2	4.6	4.6	3.1
General employee (n = 159)	39	13.2	24.5	5.7	6.3	3.8	7.5
Contract / dispatch (full time) Employee (n = 12)	33.3	33.3	16.7	8.3	0	8.3	0
Other (n = 3)	33.3	0	0	0	66.7	0	0

Although information on the Internet related to business partner companies is utilized even in the stage of, it is most utilized especially at the stage of making projects prior to calling out as a business partner, that is, at awareness stage. Analyzing by cross tabulation (see Table 1) by job title, the percentage of respondents who have "recognized the task and become a project within the company" at all job title levels is highest. A particular note is that 20.0% of respondents answered "In evaluating proposals and selecting suppliers" for management and executive classes, information on the Internet is used for management team selection. It also shows that it influences the purchase decision of Furthermore, in order to grasp the importance of corporate website information of business partner companies among information on the Internet, "At that time, information on the Internet website of a supplier (supplier) How much do you value? ". In the overall trend, the emphasis degree is 60.1%, which is the sum of "emphasize corporate website information" (10.4%) and "rather emphasize" (49.7%), about 60% are corporate website information we are emphasizing that they are emphasizing. In addition, in Table 2, the degree of importance of corporate website is classified according to the stage of purchasing process. It was emphasized in the order of 'Selecting candidate vendors' (67.6%), 'Recognizing tasks and becoming in-house projects' (64.8%). In other words, not only in the awareness stage, but also in the search stage, information on the corporate website is emphasized.

Table 2: Importance of Website Information in Purchasing Process

	Overall %	Do not emphasize	I will not emphasize if anything	I cannot say either	Somewhat emphasize	To emphasize
Overall (n = 384)	100	1.6	6.5	31.8	49.7	10.4
Recognizing the task and becoming a matter within the company (n = 156)	100	1.9	6.4	26.9	55.8	9
Stipulating the requirements of demand (n = 48)	100	0	6.3	43.8	37.5	12.5
Selecting candidate vendors(n = 99)	100	0	5.1	27.3	54.5	13.1
Requesting a candidate to submit a proposal (n = 25)	100	0	4	44	52	0
Evaluate the proposal and select suppliers (n = 29)	100	3.4	3.4	37.9	44.8	10.3
At the stage where the vendor decides to inform the company and the vendor decides (n = 12)	100	8.3	16.7	41.7	16.7	16.7
Other (n = 15)	100	6.7	20	33.3	26.7	13.3

From the above results, the information on the Internet on the business partner company is utilized from the early stage of the project in the granite company, but in particular, the information of the business website of the business partner company is also regarded as important in the search stage. The information on the corporate website has a great influence on the purchase decision making of the search stage, which is "the stage of selecting candidate vendors". In B2B marketing, if the possibility of being selected as a candidate trading company increases, sales representatives can be active in subsequent purchasing processes, so that they can withstand not only the awareness stage but also the search stage. Information on corporate website is important.

Next, there is an emphasis on detailed information on products and services. Next, in order to consider what type of information content of corporate website is important, "As a supplier how important do you think the following points on the Internet website of the company (enterprise)?".

Table 3: Information Content of Company Website

There is detailed explanation information on products and services	4.057
Product / service specification information	4.026
Product / service information immediately Searching is possible	3.984
There is explanation about handling of products and services	3.818
Drawing and photographs of products and services are provided	3.766

The importance score value is calculated by weighted average of the values asked by the five methods. Looking at the score value, the top is 4.057 points in "There is detailed explanation information on products and services", followed by "product/service specification information" (4.026 points), "product / service information immediately Searching is possible" (3.984 points). From this result, it is important for detailed information on products and services to be posted firmly on the corporate website of the trading partner, and to be able to reach the information immediately. In order to simply improve the corporate image, rather than put emphasis on designing only the top page cleanly, granite companies should make efforts to organize the information on their products and services and to convey them in an easy-to-understand manner.

In addition, the easiness to understand is not limited to the information access side by the search function, but also that "there is explanation about handling of products and services" (3.818 points), "drawing and photographs of products and services are provided" (3.766 points) shows a higher numerical value than the other items, it is also important how to devise expression of the provided information. Based on the survey data obtained from survey items obtained from the destination, factor analysis was conducted to extract elements considered important on the corporate website of granite industry corporate workers. Table 4 shows factor analysis results.

Table 4: Balance between Product/Service Information and Corporate Strategy Information

Factor analysis	Factor I	Factor II	Factor III	Factor IV	Cumulative
<b>I "Handled item detailed information" (n = 9 <math>\alpha</math> = 0.918)</b>					
Detailed explanation information on products / services is available	0.847	0.089	0.039	0.094	0.581
Explanation on handling of products / services	0.806	0.15	0.254	0.103	0.621
The product and service information can be searched immediately	0.794	0.143	0.042	0.15	0.736
Q & A concerning the handling of products / services is available	0.701	0.086	0.304	0.176	0.549
Product / service specification information	0.696	0.188	0.011	0.017	0.676
Product and service catalog can be downloaded	0.686	0.006	0.28	0.176	0.748
Drawings and photos of products and services are to be provided	0.671	0.126	0.278	0.119	0.788
There are case examples of introduction of products / services (precedent case)	0.552	0.134	0.475	0.031	0.537
<b>II "Corporate Strategy Information" (n = 5 <math>\alpha</math> = 0.896)</b>					
Content on management strategy	0.077	0.858	0.164	0.177	0.8
Content on business strategy	0.117	0.806	0.163	0.181	0.723
Content on management vision	0.124	0.743	0.132	0.241	0.643
Content on CSR	0.169	0.718	0.226	0.041	0.52
Content on IR	0.14	0.692	0.168	0.027	0.527
<b>III "Research and Development Information" (n = 4 <math>\alpha</math> = 0.868)</b>					
There is an introduction of R & D personnel on product / service development	0.123	0.271	0.829	0.108	0.74
There is an introduction of research and development bases related to product and service development	0.154	0.221	0.813	0.078	0.577
Ability to download research papers on product and service development	0.196	0.16	0.716	0.006	0.597
It is not products / services themselves, but there are useful surrounding information	0.433	0.236	0.539	0.067	0.557
<b>IV "Top Page Information" (n = 2 <math>\alpha</math> = 0.749)</b>					
Image of the whole top page	0.185	0.078	0.079	0.775	0.648
Information coverage at the top page	0.217	0.277	0.064	0.659	0.562
<b>Load</b>	<b>7.615</b>	<b>2.815</b>	<b>1.826</b>	<b>1.284</b>	
<b>Send rate (%)</b>	<b>24.364</b>	<b>17.612</b>	<b>15.021</b>	<b>6.854</b>	
<b>Cumulative rate of dispatch (%)</b>	<b>24.364</b>	<b>41.976</b>	<b>56.997</b>	<b>63.851</b>	

Four factors whose initial eigen value exceeds 1 were extracted by the main factor method. The cumulative contribution rate up to factor 4 is 63.851%. Looking at each factor, the factor I load factor of items such as "there is detailed explanation information on products and services" and "there is explanation on the handling of products and services" is high in factor I, so "Handled item detailed information" factor. The factor II is named "corporate strategy information" factor because the factor load is high in items such as "content on management strategy" and "content on business strategy". Likewise, factor III is named "R & D information" factor, factor IV is called "top page information" as a factor. Reliability analysis of each factor revealed that  $\alpha$  coefficient of Cronbach was I = 0.918, II = 0.896, III = 0.868, and IV = 0.749, respectively. All  $\alpha$  coefficients are 0.700 or more, and the reliability is also high. Looking at the contribution rate, factor I was 24.364% higher than other factors, and it became clear that the detailed information of the handling item is indispensable also on the corporate website.

This research was conducted in granite industries of Tamilnadu based on two research propositions. The first is "Corporate Web - The stage is used at what stage in the purchasing process is the site used? ", and the second is the research proposition " Will corporate strategy information be emphasized on corporate website? "Regarding the first one, "What kind of company websites is used in the purchasing process?" In the survey results, information on corporate websites was emphasized not only at the awareness stage but also at the search stage. In addition, at the search stage "evaluating proposals and selecting suppliers", managers and executives responded that they are utilizing information on the net, which also greatly affects purchasing decisions. In B2B marketing, if selected as a candidate trading company, sales representatives can be active in the subsequent purchasing process and can be linked to sales, so that they can withstand not only the awareness stage but also the search stage Information of a company website should be provided. Also, regarding the second "whether enterprise strategy information is important on corporate website", detailed information on handled goods such as detailed handling information on products and services and specification information is the most information contents of corporate website It was emphasized. However, not only is the product and service information fulfilling, but also the corporate strategy should also be conveyed in a balanced manner.

## V. CONCLUSION

This research conducted in granite industries of Tamilnadu aimed at the possibility of usage of corporate website in B2B business. The first issue is the expansion and refinement of the survey target. In this survey, the subjects to be surveyed were granite company workers, but purchasing companies of B2B business are not limited, but are often B2C companies that are final producers for consumers. It is necessary to further clarify the responsibilities related to purchasing decision making and to refine the research target. Another challenge is to refine the use of corporate websites in the purchasing process. In this research, it was indicated that the company website is emphasized in the awareness stage and the search stage in the purchasing process, but the function required for the corporate website should be different depending on the stage. It is necessary to refine the functions and information contents of corporate websites that are required for each stage. The last challenge is to clarify the significance of corporate strategy information on the B2B corporate website. In this research, it was suggested that not only detailed information on products handled but also information on corporate strategy should be balanced, but B2B it is not clear what kind of significance or role corporate strategy information has in business. It is being studied that B2B companies also influence the reliability of corporate brands and companies on purchasing but how far does a company website have company brands whether to support the creation of reliability is unknown. Corporate brands and reliability cannot be constructed only with corporate websites, but it is necessary to clarify what kind of contribution they make in terms of marketing strategy.

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## Analysis of the Conceptual Diagrams of Prospective Engineers and Prospective Designers on Creativity

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### Abstract---

**Background/Objectives:** The purpose of this study is to analyze the knowledge and structure of creativity to understand the concept of creativity of preliminary designers and preliminary engineers among university students.

**Methods/Statistical analysis:** In this study, 30 preliminary designers and 30 preliminary engineers among the university students of two universities located in Busan City were randomly sampled and 60 students were selected as research subjects.

**Findings:** The findings of the study were as follows: First, both the preliminary designer and the preliminary engineer had the highest idea of 'idea' as the upper concept of creativity. Second, the number of the super ordinate concepts that the prospective engineers described was 165, and that of the superordinate concepts used by the prospective designers was 136. As a result of categorizing the terms presented by the two groups based on similarity, their words were respectively classified into 19 categories. Third, as a result of analyzing their density scores on creativity, the density of the conceptual diagrams of the prospective engineers ranged from 1.00 to 2.62, and that of the conceptual diagrams of the prospective designers was between 1.00 and 3.42. The density scores of the two groups tended not to be high.

**Improvements/Applications:** The findings imply that their knowledge of creativity was parallel and not integrated properly rather than hierarchical and well organized.

**Keywords---** Prospective Engineer, Prospective Designer, Creativity, Conceptual Diagram.

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## I. INTRODUCTION

In the 21st century education and emphasizing creativity it may not be an exaggeration to say that there are constantly emerging as global core competencies for this<sup>1</sup>. Recent scholars who study creativity are extracted as the toughness factor in creativity, including positive examples in creativity, not to environmental factors<sup>2</sup>. Creativity is also the importance of creativity in education, but education is recognized and appreciation of creativity, education is do not understand<sup>3,4</sup>. To find out the general awareness of the creativity in the education of these are out of this study is the concept of creativity targeted pre-kindergarten teachers<sup>5</sup>. But the study also looks will need to analyze the concept of creativity in other fields.

Especially these days, there is education, including science, technology, engineering, emotion, art and expression of creativity to be made in the area of individual competence in the various areas of convergence talent and future oriented<sup>6</sup>. Thus, in the field of information technology and design arts to foster integration and human resources, it needs to be investigated on the perception of creativity.

The purpose of this study is to analyze the knowledge and structure of creativity to understand the concept of creativity of preliminary designers and preliminary engineers among university students. To be specific, it's intended to analyze the conceptual diagrams of prospective engineers and prospective designers about creativity to determine their knowledge of creativity and the structure of their knowledge to find out what knowledge made up for their ideas of creativity, what concepts they properly understood and what concept they didn't in order to suggest some of the right directions for creativity education and lay the foundation for the development of creativity education programs<sup>7,8</sup>.

In order to achieve such research objectives, the following research problems were set up.

1. What are the contents of the creativity concepts of prospective engineers and prospective designers that appear in their conceptual diagrams?
2. What are the levels of their knowledge of creativity concepts that appear in their conceptual diagrams?

## II. METHOD

### A. *The Subjects*

The subjects in this study were 60 randomly selected students at two different universities located in the city of Busan. Out of them, 30 students were prospective engineers who majored in media engineering and computer engineering at one of the two universities, and 30 students were prospective designers who majored in fashion design at the same university and who majored in visual design at the other university.

### B. *Data Collection*

Small-group interviews were conducted to ask them to draw up conceptual diagrams. After this researcher explained conceptual diagram and how to make it to the prospective engineers and designers, they drew up conceptual diagrams in the following order: First, they wrote down every concept that came into their mind about creativity. Second, they put more comprehensive and general superordinate concepts on the top, and then subordinate concepts of level 1 related to the superordinate concepts were listed under them. Third, the superordinate concepts were linked to the corresponding subordinate concepts by drawing lines. Fourth, additional subordinate concepts related to the subordinate concepts of level 1 were listed under them, and the concepts that seemed to be related to each other were linked by drawing lines. Fifth, connective words were written on the lines that linked the concepts in order to show how they were related. Whenever a new concept came into their mind, they wrote it on a new notepad and put the notepad on what seemed to be the right location in the conceptual diagrams. There was no limit to the number of the concepts described by them, and it took about 30 minutes to an hour for them to draw up the diagrams.

### C. *Data Analysis*

The collected data were analyzed based on earlier studies of conceptual diagrams including <sup>9</sup>'s study and <sup>10</sup>'s study and according to the analysis methods used in <sup>11</sup>'s study. A statistical package PASW 18.0 was utilized to obtain statistical data on mean, standard deviation, frequency and percentile.

### III. RESULTS

#### A. The Contents of the Conceptual Diagrams on Creativity

Table 1 shows the superordinate concepts described by the prospective engineers.

Table 1: The Frequency of the Superordinate Concepts in the Conceptual Diagrams of the Prospective Engineers on Creativity

No	The Superordinate Concepts	The Similar Concepts	Frequency (N)	Percentage (%)
1	Development	development(8), progress(2), patent(2), research(2), change(1)	15	9.09
2	Idea	idea(7), ideas in the department of media engineering(1), unique idea(1)	9	5.45
3	Imagination	imaginative power(5), imagination(3), thinking faculty(1), daydream(1)	10	6.06
4	Originality	originality(4), novel(3), something unthinkable(1), something different(1), original(1), special(1), startup(1), something unusual(1)	13	7.87
5	Creation	creation(3), newness(2), renovation(2), creativity(1), something new(1), making something out of nothing(1), novel(1), novel things(1), new(1)	13	7.87
6	Human	human(3), talented person(1), genius(1), me(1), cleverness(1), friend(1)	9	5.45
7	Science	science(3), invention(2), IT convergence technology(2), IT convergence(2), convergence(1)	10	6.06
8	Inverse Concept	inverse concept(2), imitation(2), application(1), copy(1)	6	3.63
9	Thought	thought(2) useless thoughts(1), the fourth dimension(1), sparkling(1), opinion(1), why(1), question(1), infinitude(1), novelty(1), chance(1), difference(1), outrageous(1), diverse(1), infinity(1)	15	9.09
10	Arts	arts(2), experience(2), results(1), picture(1), product(1), creation(1), architecture(1), design(1), design(1), brand design(1)	12	7.27
11	Freedom	freedom(2), life(1), daily life(1), money(1)	5	3.03
12	Future	future(1), requirements of future society(1), future technology(1), revolution(1), improvement(1), dream(1)	6	3.63
13	Attitude	insight(1), attention(1), agility(1), flexibility(1)	4	2.42
14	Media	scenario(1), character(1), advertisement(1), cartoon(1), film(1)	5	3.03
15	Feeling	difficult(1), tough(1), discomfort in daily life(1), inconvenience(1), repulsion(1), convenience(1)	6	3.63
16	Education	character(1), college(1), educational background(1), activity(1), service(1), cognition(1), cognitive skills(1), necessity(1), employment(1), occupation(1)	10	6.06
17	Brain	brain(1), IQ(1), aptitude test(1), IQ test(1)	4	2.42
18	Self-Development	ability(1), certificate(1), talent(1), ways of improvement(1), dexterity(1), possibility(1), success(1)	7	4.24
19	Others	cpcu(creativity personality curation)(1), company(1), psycho(1), ×2(1), gemstone(1), plus(1)	6	3.63
Total			165	100.0

As shown in Table 1, the number of the superordinate concepts described by the prospective engineers was 165. When the concepts were categorized based on similarity, there were 19 superordinate concept categories. To be specific, "development" and "idea" were the most widely used concepts(15 times, 9.09% respectively).

Table 2 shows the superordinate concepts described by the prospective designers.

Table 2: The Frequency of the Superordinate Concepts in the Creativity Conceptual Diagrams of the Prospective Designers on Creativity

No	The Superordinate Concepts	The Similar Concepts	Frequency (N)	Percentage (%)
1	Arts	arts(8), artistic(1), intuition(1), expression(1), having to acquire a lot of experiences(1), experience(1)	13	9.55
2	Idea	idea(7), question mark(2), exclamation mark(2), something momentary(1)	12	8.82
3	Thought	thought(5), inspiration(2), open-mindedness(1), something different(1), brilliant idea(1), taking a new perspective(1), lots of thoughts(1), liberal thinking(1), unusual thought(1), different thought(1), new thinking(1), occurring to one's mind(1), something like seasoning for food(1)	18	13.23
4	Design	design(4), color(2), clothes(1), cartoon(1)	8	5.88
5	Creation	something new(3), creation(2), creative(2), newness(1),	8	5.88
6	Future	dream(2), future(1), making a further progress(1), innovation(1)	5	3.67
7	Human	talented person(2), gifted person(1), genius(1), designer(1), children(1), professor(1), being born with(1)	8	5.88
8	Self-Development	endeavor(2), self-development(1), self-confidence(1), what I have to do(1), growing(1), note(1)	7	5.14
9	Travel	travel(2), observation(1), money(1)	4	2.94
10	Invention	invention(1), discovery and invention(1), machine(1), shifting a viewpoint(1), observation(1)	5	3.67
11	Originality	originality(1), my own unique thing(1), something unique(1), something different(1), something amazing(1), being differentiated from others(1), what everybody pursues yet not everybody tries to get(1), good solutions(1), startup(1)	9	6.61
12	Imaginative Power	imaginative power(1), imagination(1), something hidden(1), what can make me fly if it wants to do it(1)	4	2.94
13	Education	study, knowledge is the basis(1), basis(1), humanities(1), assignment(1), goal(1)	5	3.67
14	Creativity	creativity(1), individuality(1), imitation(1)	3	2.20
15	Feeling	pleasant(1), interest(1), stereotyped(1), hard(1), something difficult to do(1), The best is doing without any preset plan(1), different(1), not easy(1), the same in form yet different somewhere(1), cannot control one's amazement(1), intuition(1)	11	8.08
16	Brain	brain(1), human desires(1), head(1)	3	2.20
17	Creation	creation(1), folding paper(1), what's helpful for drawing a picture(1)	3	2.20
18	Age	age(1), country(1), competitiveness(1)	3	2.20
19	Others	conversation(1), insurance(1), start(1), sleeping(1), the opposite of being fed up(1), de-constructivism(1), being concerned with character(1),	7	5.14
Total			136	100.0

As shown in Table 2, there were 136 superordinate concepts that the prospective designers described about the contents of creativity. As a result of categorizing the concepts based on similarity, 19 categories of superordinate concepts were selected, and "thought" was the most frequent concept that appeared 18 times(13.23%).

### **B. The Knowledge Level of the Conceptual Diagrams on Creativity**

The hierarchy of the ten superordinate concepts that most frequently appeared in the conceptual diagrams of the prospective engineers was analyzed, and the number of the subordinate concepts that belonged to each of the superordinate concepts was investigated as well, besides, the saliency scores of the superordinate concepts were calculated. The results are shown in Table 3.

Table 3: The Characteristics of the Superordinate Concepts in the Conceptual Diagrams of the Prospective Engineers on Creativity

No	The Superordinate Concept	Frequency (%)	No. of the Subordinate Concepts		Hierarchy		saliency scores	
			M	SD	M	SD	M	SD
1	Development	15(9.09)	5.08	2.79	3.08	1.31	0.26	0.14
2	Idea	9(5.45)	5.50	3.93	3.00	1.41	0.24	0.12
3	Imaginative Power	10(6.06)	3.89	2.57	2.56	1.13	0.19	0.10
4	Originality	13(7.87)	3.60	2.12	2.60	1.17	0.19	0.08
5	Creation	13(7.87)	4.00	2.13	2.83	1.11	0.19	0.09
6	Human	9(5.45)	3.88	2.30	2.63	1.30	0.20	0.10
7	Science	10(6.06)	4.44	2.45	2.89	1.09	0.21	0.10
8	Inverse Concept	6(3.63)	4.25	3.40	2.50	1.29	0.12	0.07
9	Thought	15(9.09)	5.00	3.78	2.58	1.38	0.21	0.15
10	Arts	12(7.27)	3.60	3.13	2.20	1.13	0.13	0.07

As shown in Table 3, the number of the subordinate concepts was analyzed, and the average of the subordinate concepts that belonged to "idea" was highest with 5.50 times (SD=3.93), followed by "development" (M=5.08, SD=2.79) and "thought" (M=5.00, SD=3.78). As for hierarchy, the hierarchy average of "development" was highest with 3.08 (SD=1.31), followed by "idea" (M=3.00, SD=1.41) and "science" (M=2.89, SD=1.09). Regarding saliency scores, the average of the saliency scores of "development" was highest with 0.26 (SD=0.14), followed by "idea" (M=0.24, SD=0.12), "science" (M=0.21, SD=0.10) and "thought" (M=0.21, SD=0.15).

Density refers to how much each category is organized in a hierarchical and integrative way in a conceptual diagram. Table 4 shows the density of the conceptual diagrams of the 40 prospective engineers.

Table 4: The Density of the Creativity Conceptual Diagrams of the Prospective Engineers

Engineer ID	Density	Engineer ID	Density	Engineer ID	Density
1	1.75	11	1.23	21	1.14
2	1.00	12	1.00	22	1.45
3	2.50	13	2.62	23	1.35
4	1.35	14	2.33	24	1.25
5	1.94	15	1.50	25	1.52
6	1.50	16	1.77	26	2.22
7	1.00	17	1.92	27	1.60
8	1.00	18	1.29	28	2.00
9	1.00	19	1.07	29	1.88
10	1.13	20	1.82	30	1.10

As Table 4 shows, the density of the conceptual diagrams of the prospective engineers ranged from 1.00 to 2.62.

The hierarchy of the superordinate concepts that most frequently appeared in the conceptual diagrams of the prospective designers was analyzed, and the number of the subordinate concepts that belonged to each of the superordinate concepts was analyzed as well. In addition, the saliency scores of the superordinate concepts were calculated. The results are shown in Table 5.

Table 5: The Characteristics of the Superordinate Concepts in the Creativity Conceptual Diagrams of the Prospective Designers

No	The Superordinate Concepts	Frequency (%)	No. of the Subordinate Concepts		Hierarchy		Saliency scores	
			M	SD	M	SD	M	SD
1	Arts	13(9.55)	4.57	2.77	2.71	1.14	0.24	0.11
2	Idea	12(8.82)	3.89	3.34	2.20	0.94	0.24	0.18
3	Thought	18(13.23)	4.00	2.65	4.15	1.30	0.30	0.25
4	Design	8(5.88)	4.83	2.32	5.83	1.17	0.27	0.09
5	Creation	8(5.88)	4.43	2.51	6.71	0.69	0.24	0.06
6	Future	5(3.67)	4.25	1.71	3.00	1.41	0.21	0.12
7	Human	8(5.88)	5.63	5.15	2.75	0.89	0.27	0.20
8	Sell-development	7(5.14)	5.67	5.79	3.67	2.08	0.27	0.14
9	Travel	4(2.94)	2.67	1.53	2.00	1.00	0.18	0.08
10	Invention	5(3.67)	5.00	2.45	3.20	0.84	0.22	0.18

As shown in Table 5, the number of the subordinate concepts was analyzed, and the average of the subordinate concepts that belonged to "self-development" was largest with 2.67 times (SD=5.79), followed by "human" (M=5.63, SD=5.15) and "invention" (M=5.00, SD=2.56). As to hierarchy, the hierarchy average of "creation" was highest with 6.71 (SD=0.69), followed by "design" (M=5.83, SD=1.17) and "thought" (M=4.15, SD=1.30). Concerning saliency scores, the average of the saliency scores of "thought" was largest with 0.30 (SD=0.25), followed by "design" (M=0.27, SD=0.09), "human" (M=0.27, SD=0.20) and "self-development" (M=0.27, SD=0.14).

Density refers to how much each category is constructed in a hierarchical and integrative way in a conceptual diagram. The density of the conceptual diagrams of the 30 prospective designers is shown in Table 6.

Table 6: The Density of the Creativity Conceptual Diagrams of the Prospective Designers

Designer ID	Density	Designer ID	Density	Designer ID	Density
1	2.33	11	2.09	21	2.07
2	1.45	12	1.60	22	1.41
3	1.23	13	2.60	23	1.40
4	1.00	14	1.26	24	1.70
5	1.40	15	1.62	25	3.42
6	1.00	16	2.00	26	1.25
7	1.10	17	1.41	27	1.10
8	1.33	18	1.31	28	1.00
9	2.25	19	1.80	29	1.33
10	1.00	20	1.37	30	1.00

As Table 6 shows, the density of the conceptual diagrams of the prospective designers ranged from 1.00 to 3.42.

#### IV. CONCLUSION

The findings of the study on the creativity knowledge level of the prospective engineers and designers can be summarized and discussed as follows:

First, when the knowledge level of the prospective engineers and designers on creativity was analyzed using a conceptual diagram technique, "thought" was most frequently used in both groups. In other words, the prospective engineers and designers placed the most importance on "thought" in terms of creativity. In the conceptual diagrams of the prospective engineers, the number of the subordinate concepts that belonged to "idea" was largest, and the hierarchy and saliency scores of "development" were highest. In contrast, the number of the subordinate concepts that belonged to "self-development" was largest in the conceptual diagrams of the prospective designers. "Creation" was highest in hierarchy, and the saliency scores of "thought" was highest.

Second, the number of the superordinate concepts was 165 in the prospective engineers and 136 in the prospective designers. When the concepts described by the two groups were categorized based on similarity, they were classified into 19 categories respectively.

Third, density refers to how much a category of knowledge is organized in a hierarchical and integrative way. As a result of analyzing the density scores of their conceptual diagrams, the density of the conceptual diagrams of the prospective engineers was between 1.00 and 2.62, and that of the conceptual diagrams of the prospective designers ranged from 1.00 to 3.42. The density tended not to be high in the two groups. The findings imply that their knowledge of creativity was parallel and not integrated properly rather than hierarchical and well organized.

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## A Study on Developing HMD-Based Virtual Art Exhibition Contents

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### Abstract---

**Background/Objectives:** IT technology is creating a new paradigm in art which couldn't emerge from canvas as well as health care, education and entertainment.

**Methods/Statistical analysis:** An appropriate platform for virtual exhibition was developed by analyzing differences between real and virtual exhibition and presenting a methodology for virtual exhibition.

**Findings:** It is now possible for audiences who have passively viewed, to communicate with works in more friendly ways and authors are also able to deliver effective messages beyond limits of expression. However, if it is required to supplement personnel and use expensive VR equipments for organizing contents, it may cause tough results which beyond the ability. This study aimed to enable authors to effectively communicate with audiences using the virtual exhibition which can interact and to present platformization of virtual gallery intended for multi-time rather than one-shot.

**Improvements/Applications:** Studies on reflecting techniques that audiences can feel in real exhibition, have to be conducted and studies on virtual exhibition platform for universalization of the virtual exhibition also have to continue.

**Keywords---** Virtual Gallery, Virtual Experience Exhibition, VR, HMD, Platform, Virtual Exhibition Methodology.

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## I. INTRODUCTION

An art is a medium to communicate with the audiences concerning messages that the authors would like to deliver using metaphoric expression's ways such as writings, sounds and pictures. An exhibition is defined as a collection that various exhibits in one place were collected for display after gathering arts. The exhibition can be regarded as a kind of communication media. That is, in this environment, communication means placing foundation to create an environment for the audience include technologies of photos, videos, texts, colors, sounds and motions. <sup>1</sup>Recently, as this exhibition space online has been built, it is now possible to effectively interact with the audiences as well as to remove temporal and spatial constraints. Now, it is also available to conduct audience-driven performance beyond one-sided representation of the author. This study aims to present development direction of future virtual exhibition through studying methodology for effective communication by it and designing and building the virtual exhibition.<sup>2</sup>

## II. A CONCEPT AND CHARACTERISTICS OF EXPERIENCE SPACE OF VIRTUAL EXHIBITION

The virtual experience exhibition refers to fusing virtual exhibition and experience exhibition and then expanding them into new exhibition areas. It has been shown the development of the exhibition area resulted from extended user's access and participation in time (temporal) and space (spatial) aspects. In the virtual experience, actually untouchable exhibits were represented as virtual digital exhibits using various IT equipment and visual and auditory sensors. In addition, it possible for the users to interact in a virtual space without temporal and spatial constraints so that they can experience even feeling and emotion that they have never felt in the real world.<sup>3</sup>

The followings are differences between an actual exhibition and a virtual exhibition for reflection into virtual exhibition design.

### A. Characteristics of the Actual Exhibition (or Gallery)

In real space, stories continue according to natural flow of viewer's movement with communication between actual works and the audiences. Having lower direct participation than the virtual exhibition, it is an exhibition of passive type and being designed by subjectivity of an exhibitor, it has lower awareness on visitors. In addition, it must be configured in real space, having time and space constraints. However, it is able to deliver vividness through olfactory sense, tactile sense and texture by physical objects.<sup>4</sup>

### B. Characteristics of the Virtual Exhibition (or Gallery)

In the virtual space via web and mobile, there is communication between works and the audiences. The virtual space has to be configured considering structure of information, interactive storytelling, arrangement and usability, etc. and it has to also express and reflect the portions that may be insufficient compared to actual exhibition. It uses a technique to induce the interaction between displays and viewers using a variety of multimedia elements and transcendental expression.<sup>5</sup>

## III. STATUS OF VIRTUAL EXPERIENCE EXHIBITION

### A. Case Analysis

Cases of current virtual exhibition have been organized as shown in Table 1.

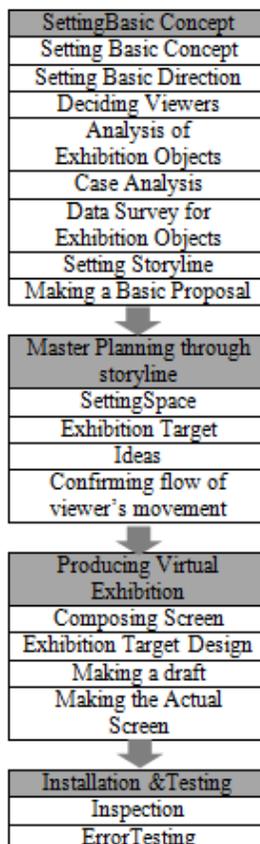
Table 1: Cases of Virtual Exhibition

Organization /Company Name	Contents	Features
Google	Google Art Project	Through a collaboration work with Royal Museums of Fine Arts of Belgium, a work of Bruegel who is a Dutch painter was released as a moving picture and 360- degree video. Then, works of various authors such as Van Gogh's ones were implemented.
District	Live Park 4D	Facial expression recognition, touching IR sensing-type, motion/sound & voice sensing, holograms, 3D, controlling avatar, creating high-definition video content of media façade-type, displaying linkage among multi-channels, spherical/hemispherical applicable possibility, secured 'Real-time video control engine' technology. held 'Theme park & '4D Live Park'.
Samsung Electronics	VR Experience Zone	In VR experience zone, the exhibition is operated with virtual reality contents such as looking around inside of exhibition and main products including Samsung IoT ones from its entrance like actual exhibition visits by moving to Samsung Electronics while skydiving. The exhibition information is provided by Samsung (www.samsung.com) and Samsung Tomorrow (global.samsungtomorrow.com).
Kia Motors	Kia Digital Gallery	Kia Motors virtually exhibits art works of Orsay Museum by 'Kia Digital Gallery' which is a digital signage(outdoor advertising) device installed in 324 branches and 20 service centers all over the country.

#### IV. DEVELOPMENTAL PROCESS FOR VIRTUAL EXHIBITION SPACE

Based on previous case analysis, the developmental process for virtual exhibition space has been summarized according to Plan and Development of the Cyber Exhibition by Kim, Hee-Kyung as shown in Table 1.<sup>5</sup>

Table 2: Typical Developmental Process of a Virtual Exhibition



Here, the developmental process of virtual exhibition space will be proposed considering one of virtual experience exhibition although there were no specifically formal procedures concerning that. The developmental processes in this paper are as follows and it was proposed in study of Kim, Hyun-Seok and Yim, Chang-Young on design process for development of virtual exhibition space.<sup>6</sup>

##### ***Definition and Analysis Phase of Exhibition Space***

An author as a target of set design in the exhibition space is defined and design problems are analyzed. The problems of virtual exhibition space are very broadly abstract. Therefore, it is required to set a basic exhibition space and consider the platform to be expressed. In this paper, the platform to be expressed is set with HMD standard. In this phase, time line and additional details for the entire exhibition are adjusted.

##### ***Creating Scenarios Phase of Exhibition Display***

The concept of the basics previously decided is set and theme of the exhibition is decided. A scenario for the exhibition display is created and stories, contents, expressive techniques are decided. The author's information and data are collected and research is progressed for overall direction of the exhibition.

##### ***Prototyping and Planning Phase for Additional Work***

It is a necessary phase, if there are additional requirements by the author beyond using basic exhibition space. The author also additionally amends overall parts of exhibition space together. The width of wall and atmosphere and additional objects are discussed and display of objects and requirements are resolved.

### ***Production Phase***

In the production phase, designers and related professionals participate in a final production. The final integration by the program is performed and understanding and adjusting exhibition space are required. The final results are made in this phase so that it is necessary to pay close attention. Exhibition space created becomes a platformization through final testing. The actual exhibition space is hard to modify but virtual exhibition is available for continuous feedback and immediate modification so that is very flexible for unexpected situations.

## **V. DEVELOPMENT OF VIRTUAL GALLERY**

### ***A. Design of Virtual Exhibition***

After lending an actual exhibition space more than four pyong, actual works were exhibited and additional works were exhibited in the virtual space as shown in Figure 1 using Gear VR. The visitors can feel expressive technique of the author and texture of works through actual works and VR contents were produced to deliver meaning effectively.



Figure 1: Virtual Exhibition in Actual Exhibition Space

### ***B. Scenarios and Expressive Techniques***

Planning was performed with a subject of IN COLD BLOOD by KINGHONG author. The room of the author along with actual exhibition works was organized as a space as shown in Figure 2. The purpose was to produce the most realistic images according to the characteristics of the exhibition space and the intention of planning. Each object such as paints, easels, paint buckets was produced using Cinema4d and UV is applied using UV Layout program. For a realistic representation, actual images of the product used by the artist were used and if there were actual images obtained, photos of actual products were taken and then applied to UV.

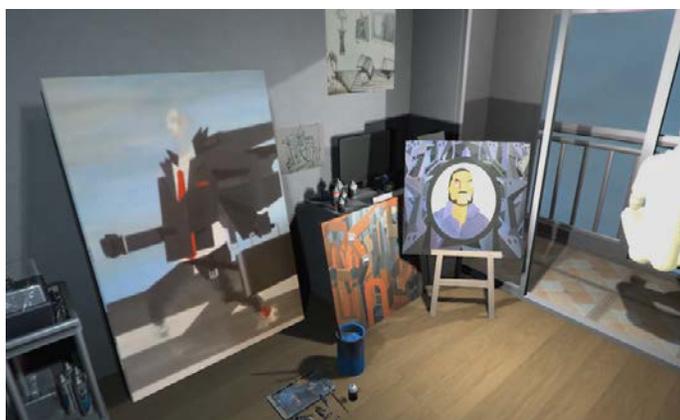


Figure 2: Room of the Author by Virtual Implement

Gear VR device was used because of confined space and lighting in Unity 5 and interaction function were added. Works for mobile optimization were performed by keeping the number of polygons of object to be less than the maximum of 30,000. When applying shader, shadows were produced as PNG files in order to mitigate the degradation of frame.

## VI. CONCLUSIONS AND FUTURE CHALLENGES

IT technology has provided a new paradigm in art which couldn't be free of canvas as well as health care, education and entertainment. Now, the viewers who have passively watched can communicate with works in more friendly ways and authors can deliver effective messages beyond expressive restrictions. However, supplement of personnel and use of expensive VR equipment to make contents may cause tough results which beyond the ability. This study aimed to enable authors to effectively communicate with audiences through the virtual exhibition that can interact and to present contents of virtual gallery and directions of platform development. Firstly, it should be made for the purpose of multi-time rather than a one-shot for efficient utilization of the virtual display. However, it should secure flexibility of concept according to various scenarios of the gallery. Secondly, studies on reflecting techniques felt in an actual exhibition should continue. The studies on interface considering characteristics of virtual exhibitions and interaction for it as well as platforms for virtual exhibition's generalization have to be conducted.

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## The Effects of After-School Sports Activities on Self-Esteem and School Adjustment of Adolescents from Multicultural Families in South Korea

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### Abstract---

**Objectives:** We examined the effects of participation in after-school sports activities on self-esteem and school adjustment among adolescents from multicultural families in South Korea.

**Methods/Analysis:** One hundred sixty adolescents from multicultural families were participated in this study. Data were analyzed using t-tests, correlation analysis, and multiple regression analysis. Dependent variables were exercise self-esteem and school adjustment.

**Findings:** We found that participation status in after-school sports activities had a significant effect on certain aspects of self-esteem and school adjustment.

**Applications:** Participating in after-school sports activities appears to be an effective means for adolescents from multicultural families to form positive, healthy peer relationships, which in turn may positively influence students' school adjustment.

**Keywords---** Multicultural Families, Sports Activities After School, Self-Esteem, School Adjustment, Adolescents.

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## I. INTRODUCTION

Globalization in the 21<sup>st</sup> century has ushered in a new era of international migration. The growing number of international marriages and the resulting changes to the family make-up have caused society to shift towards being more multicultural and multiracial<sup>1,2</sup>. In fact, the number of foreign nationals residing in the Republic of Korea exceeded 1 million in 2007, accounting for approximately 2% of the total population of Korea. Moreover, the number of students from these multicultural families has steadily increased in recent years: in 2013, 50,780 students were found to be from multicultural families, which was an 18.8% increase (8,826) from the 46,954 of the previous year. Similarly, the total number of students from multicultural families enrolled in elementary, middle, and high schools in Korea doubled between 2009 (26,015) and 2013 (55,780); in 2013, 70.7%, 20.2%, and 9.1% of these students were enrolled in elementary, middle, and high schools, respectively<sup>3</sup>.

As these figures indicate, Korean society is becoming multicultural. Unfortunately, Korean nationals are still grappling with a cultural emphasis on ethnic homogeneity, which has contributed to multicultural families' struggles being overlooked as they try to fit into society. Many marriage-based immigrants and immigrant workers do indeed experience hardships in attempting to adjust to their new homelands. Such hardships extend to their children at school, where such children must balance learning the language with attempting to cope with confusion in their identity, ostracism, and bullying<sup>4</sup>. Allowing these issues to persist may lead this population to become disenfranchised, which might ultimately result in the insidious social problem of polarization. Clearly, prevention through educational intervention is of paramount importance<sup>5</sup>.

Most children from multicultural families who are distinguished from their peers by skin color or other physical features are vulnerable to ostracism and other forms of discrimination in schools in South Korea, where cultural prejudice based on race and skin color prevails, just because one of their parents is of foreign origin<sup>6</sup>. As these children progress through school, their psychological insecurities and loss of confidence can worsen and thereby interfere with healthy emotional development. These factors also put the children at an increased risk of truancy, running away, violence, and other delinquent behaviors, potentially leading to more serious social problems<sup>7</sup>. Linguistic difficulty can even jeopardize communication between family members within multicultural families, depriving them of opportunities to share thoughts and feelings that help them understand each other on a deeper level. In fact, the resulting compromised verbal communication can lead to language disorders, stuttering, and even behavioral disorders, beyond interfering with academic learning<sup>8</sup>. Additionally, children and adolescents from multicultural families tend to fall behind in regular Korean public school curricula because of poor academic performance, which is rooted in language challenges, dropping out, conflicts in values, or inadequate paperwork. The difficulties they experience in forming meaningful relationships with peers from Korean families can also encourage them to form cliques of their own, some of which can turn violent. These factors, in conjunction with their differing appearances from Koreans, can discourage these adolescents and children from adapting to Korean society, which in turn contribute to their unfavorable image in society<sup>5</sup>. Self-esteem and sociality, which are nurtured during childhood and adolescence, are important factors promoting adolescents from multicultural families to grow into responsible citizens who can live in harmony with others<sup>9</sup>. According to<sup>7</sup>, maladjustment and stress experienced by children and adolescents from multicultural families in Korea can lead to a psychosocial crisis that interferes with their healthy development of self-esteem and self-identity, a key task during childhood and adolescence.<sup>5</sup> showed that these children and adolescents tend to experience difficulties in adjusting to their school lives, as various factors rooted in cultural differences and sociocultural prejudice can contribute to a failure to develop healthy interpersonal relationships. As a result, rather than socializing with their peers, these children and adolescents often turn to solitary play (e.g., computer games), lose interest in others, and may even develop violent tendencies (due in part to the influences of violent computer games). Thus, it can be difficult for them to acquire the social skills required to co-exist with others.

In line with increasing awareness in schools and society of the importance of cultivating healthy self-esteem in children and adolescents from multicultural families, research on this issue has been progressing in a number of relevant fields. In a 2012 study on the effects of group art therapy on children from multicultural families,<sup>9</sup> reported that the therapy led to an improvement in children's self-esteem through promotion of healthy self-expression and increased self-understanding and future certainty. <sup>10</sup>, in a 2009 study, similarly reported that a group art therapy had a positive influence on the self-esteem of children from multicultural families. In a 2010 study on the effects of a music program on the sociality and self-esteem of children from

multicultural families, Kim<sup>5</sup> found that the program contributed to improved self-esteem. As is evident, research on self-esteem of adolescents from multicultural families is active in various areas. However, there is still a lack of research on the effects of sports activities on these children.

In<sup>8</sup> argued that sports activities can promote social integration and prevent conflicts within a multicultural society. According to<sup>5</sup>, sports activities that involve social interaction can reduce the senses of foreignness and heterogeneity people often feel toward members of another group. Furthermore, linguistic barriers and racism, which can underlie social adjustment and self-esteem issues experienced by children from multicultural families, can be greatly alleviated through participation in sports activities. It is widely known that sports promote social cohesion, as they can blur the lines between participants' races, ethnicities, religions, classes, and age. Likewise, sports participation has been shown to have a positive influence on the social readjustment of adolescents who engage in delinquent behaviors<sup>5</sup>. According to<sup>9</sup>, sports must be actively promoted among adolescents because it may be the most effective tool for preventing such adolescents' progression into a life of crime. Sports can thus be considered a key element of a holistic education as they promote healthy physical, cognitive, emotional, and ethical development, which are no doubt likely to benefit children and adolescents from multicultural families as well.

Children who adjust well to school life tend to exhibit positive emotions, attitudes, and motivation. Having such a positive outlook in turn can promote healthier interpersonal relationships, better academic outcomes, and desirable behavioral traits, which can lead to personal growth and benefit both schools and society. However, children who have difficulties fitting in at school often fail to forge meaningful interpersonal relationships with peers or follow school rules, thus resulting in stunted personal growth and an increased likelihood of their growing up to become social misfits. Thus, the importance of healthy school adjustment during childhood and adolescence cannot be overemphasized. School maladjustment can also be influenced by issues such as poor academic performance, loss of academic motivation, and poor peer relationships among students from multicultural families, and can often encourage students to drop out or engage in other delinquent behaviors. These issues similarly lead to social maladjustment, which has serious social consequences. Children and adolescents from multicultural families commonly experience feelings of heterogeneity and peer alienation. Unsurprisingly, such negative emotions can interfere with these students' formation of healthy peer or teacher relationships, thus making it more difficult for these students to adjust to school life<sup>2</sup>. School adjustment can be conceptualized as a student's rational and effective fulfillment of desires pertaining to academic activities, extracurricular activities, and other school functions and events, which bring self-satisfaction and encourage harmonious interpersonal relationships with peers and teachers.

In an effort to address school adjustment, many schools have begun to increase their efforts to promote sports activities among students. Research has shown that increased participation has a positive effect on students' school adjustment<sup>5</sup>, more specifically, participation in after-school sports activities has been found to promote school adjustment among students as well as alleviate anxiety and tension, help students reach their full potential, promote health and fitness, and improve psychological and emotional stability, all of which can contribute to the maintenance of satisfying interpersonal relationships<sup>11</sup>. Given this background, we might suggest that participation in after-school sports activities is an effective way of improving students' school adjustment. Nevertheless, the effects of such participation among adolescents from multicultural families—who desperately need help with school adjustment—has not been sufficiently investigated.

In the present study, we examined the effects of participation in after-school sports activities on self-esteem and school adjustment among adolescents from multicultural families in South Korea.

## **II. METHOD**

### **A. Study Subjects**

Children and adolescents from multicultural families attending middle and high schools in D city were selected as the target population. We consulted the D city education office's data on students from multicultural families, which are stratified by district (west, east, south, and daeseodistricts), and identified schools with populations of students from multicultural families. A total of 180 subjects (90 sports-activity participants, 90 non-participants) were drawn from this pool using the quota sampling method. Excluding 20 survey responses that contained duplicate or incomplete answers, a total of 160 responses were included in the analysis. The individual characteristics of study subjects are presented in Table 1.

Table 1: Individual Characteristics of Subjects

Variable	Category	n	%
Gender	Male	82	51.25
	Female	78	48.65
Age	14	36	22.50
	15	45	28.13
	16	30	18.75
	17	28	17.50
	18	16	10.00
	19	5	3.12
Father's nationality	Korea	140	87.50
	China	10	6.25
	Japan	5	3.13
	Pakistan	2	1.25
	Others	3	1.87
Mother's nationality	Korea	22	13.75
	China	55	34.38
	Japan	25	16.62
	Philippines	34	21.25
	Vietnam	16	10.00
	Others	8	5.00
Participation status	Yes	76	47.50
	No	84	52.50
Frequency of participation	Once per week	25	15.62
	2-3 times per week	38	23.75
	4-5 times per week	49	30.63
	Daily	48	30.00
Length of participation	<6 months	55	34.38
	6 months to <1 year	41	25.62
	1 year- <2 years	26	16.25
	≥ 2 years	38	23.75
Degree of participation	< 30 min	30	18.75
	30 min to <1 h	60	37.50
	1 h- <2 h	45	28.13
	≥2 h	25	15.62
Total		160	100

As shown in Table 1, the subjects comprised 82(51.25%) male and 78(48.65%) female students. Regarding age distribution, most were aged 15 (28.13%) or 14 (22.50%). Most children had Korean fathers, at 140 (87.50%), followed by Chinese (10; 6.25%) and Japanese (5; 3.13%). As for the mother's nationality, the most common response was Chinese (55; 34.38%), followed by Filipino (34; 21.25%), Japanese (25; 16.62%), Korean (22; 13.75%), Vietnamese (16; 10.00%), and others (8; 5.0%). The fact that most subjects had Korean fathers and foreign mothers can be attributed to the "marriage project for rural bachelors" implemented by the central and local governments in the mid-1990s in South Korea, which led to an influx of migrant brides from China and southeastern Asia.

### **B. Measurement Tools**

The questionnaire used in this study comprised 53 items in four domains: 5 items on personal characteristics, 4 items on status and pattern of sports-activity participation, 32 items on self-esteem, and 12 items on school adjustment.

#### **Self-Esteem**

We used the self-esteem questionnaire translated and modified by<sup>12</sup> from <sup>13</sup>self-esteem inventory. This questionnaire comprises 32 items in four subscales: global self-esteem (one's overall sense of worth, or the aggregate opinion of oneself), social-peers self-esteem (one's sense of worth concerning how others perceive him/her as a friend), home-parents self-esteem(one's sense of worth in the family, or how one evaluates his/her relationship with parents; overall, it reflects one's feelings on oneself as a family member), and school-academics self-esteem(one's sense of worth as it relates to his/her academic performance and general capability in the context of school; evaluation of self-worth as a learner). Each item was measured on a 5-point Likertscale, from 1 (strongly disagree) to 5 (strongly agree).The Cronbach's  $\alpha$  was found to be .85-.92, indicating a high level of reliability.

#### **School Adjustment**

To measure students' school adjustment, a scale used by<sup>10,14</sup> was modified to fit the purpose of the present study. Relationships with teachers, peer relationships, and rule-abiding behavior formed the

structure of the questionnaire. Each item was measured on a 5-point Likert scale. The Cronbach's  $\alpha$  ranged from .88 to .94 for this scale, indicating a high level of reliability.

**C. Survey Procedures**

The D city education office's data on students from multicultural families in each district (west, east, south, and dalseo) were consulted to identify schools with populations of students from multicultural families. A letter was then sent to each of the schools to request their permission to participate in the study, and then students' participation status in after-school sports activities was identified. A preliminary survey was conducted on February 12, 2014; this was followed by the main survey, which was conducted between March 21 and July 15, 2014. To begin the survey process, the researcher visited each school and obtained permission to conduct the study from the principal or vice principal, following a detailed explanation of the survey purpose, design, etc. Next, the researcher met with the school's counselor for students from multicultural families to obtain their cooperation with the survey, after which the researcher met with students to administer the survey. If the researcher could not visit one of the schools, the school's multicultural counselor was contacted via telephone to obtain their help with the survey; in such cases, questionnaires were mailed to the counselor after his/her agreement, who distributed them to the students. Small thank-you gifts were provided to the teachers and students for their help and participation in the survey.

**D. Data Analysis**

Collected responses that were determined to be incomplete or unreliable were excluded from the analysis. The remaining responses were individually entered into the computer to be analyzed with IBM SPSS Statistics 21.0 for Windows. First, we conducted a frequency analysis to describe subjects' personal characteristics, followed by an exploratory factor analysis and a reliability analysis to verify the validity and reliability of each variable, respectively. A t-test was then performed to examine the differences in self-esteem and school adjustment according to subjects' participation status in after-school sports activities. In order to identify the relationships between the variables, a correlation analysis was performed. Finally, multiple regression analysis was performed to determine the precise effects of participation patterns in after-school sports activities on self-esteem and school adjustment. Dependent variables were exercise self-esteem and school adjustment.

**III. RESULTS**

**A. Analysis of Self-esteem and School Adjustment**

The results of self-esteem and school adjustment among students from multicultural families according to participation status in after-school sports activities are presented as shown in table 2, 3.

**a. Differences in Self-esteem according to Participation Status in After-school Sports Activities**

Table 2 presents the results of a t-test performed to examine the differences in self-esteem of students from multicultural families according to their participation status in after-school sports activities.

As shown in Table 2, participation status in after-school sports activities did not have a significant effect on students' home-parents self-esteem. However, it did significantly influence global self-esteem ( $t=9.43$ ,  $p<.01$ ), social-peers self-esteem ( $t=10.19$ ,  $p<.001$ ), and school-academics self-esteem ( $t=12.19$ ,  $p<.001$ )

Table 2: Self-Esteem According to Subjects' Status of Participation in After-School Sports Activities

Self-esteem	Participation status	n	M (SD)	t
Global	Yes	76	3.22 (.52)	9.43**
	No	84	2.27 (.55)	
Social-peers	Yes	76	3.28 (.52)	10.19***
	No	84	2.33 (.46)	
Home-parents	Yes	76	3.18 (.71)	3.02
	No	84	2.78 (.69)	
School-academics	Yes	76	3.98 (.51)	12.19***
	No	84	2.36 (.71)	
**p < .01, ***p < .001				

**b. Differences in School Adjustment according to Participation Status in After-school Sports Activities**

Table 3 presents the results of a t-test performed to examine differences in school adjustment according to participation status in after-school sports activities.

As shown in Table 3, participation status in after-school sports activities did not have a significant effect on students' relationship with teachers. However, it did have a significant effect on rule-abiding behavior ( $t=6.92, p<.01$ ) and peer relationships ( $t=8.80, p<.01$ ).

Table 3: School Adjustment According to Subjects' Status of Participation in After-School Sports Activities

School adjustment dimension	Participation status	n	M (SD)	t
Rule-abiding behavior	Yes	76	3.72 (.34)	6.92**
	No	84	3.06 (.52)	
Relationship with teachers	Yes	76	3.41 (.27)	3.02
	No	84	3.34 (.45)	
Peer relationships	Yes	76	3.78 (.39)	8.80**
	No	84	2.72 (.55)	
**p < .01				

**B. Correlations Analysis**

Correlations analysis was employed to investigate the relationship between school adjustment/self-esteem among students from multicultural families and their participation pattern in after-school sports activities.

Table 4 presents the results of a correlational analysis performed to identify the relationship between school adjustment/self-esteem among students from multicultural families and their participation pattern in after-school sports activities.

As shown in Table 4, all correlations between the variables were positive. Pearson's correlation analysis revealed that multicollinearity values ranged from .22 to .77, which was smaller than the cut-off of .80, indicating that multicollinearity was not a problem<sup>12</sup>. Therefore, overall, participation pattern (i.e., frequency, length, and degree of participation) was significantly correlated with self-esteem and school adjustment.

Table 4: Correlations Between Sports Activity Participation Patterns and Relevant Variables

Category	1	2	3	4	5	6	7	8	9	10
Frequency of participation	1									
Length of participation	.306**	1								
Degree of participation	.295**	.339**	1							
Global self-esteem	.292**	.355**	.385**	1						
Social-peers self-esteem	.247**	.398**	.388**	.416**	1					
Home-parents self-esteem	.225**	.218**	.268**	.435**	.481**	1				
School-academics self-esteem	.345**	.328**	.203**	.362**	.457**	.636**	1			
Rule-abiding behavior	.464**	.425**	.562**	.774**	.429**	.446**	.372**	1		
Relationship with teachers	.449**	.448**	.333**	.376**	.415**	.304**	.267**	.304**	1	
Peer relationships	.529**	.477**	.455**	.444**	.349**	.424**	.409**	.374**	.398**	1

\*\*p < .01

**C. Regression Analysis**

Regression analysis was employed to investigate the relationship between self-esteem/school adjustment among students from multicultural families and their participation pattern in after-school sports activities.

**a. The Effects of Participation Pattern in After-school Sports Activities on Self-esteem**

The results of participation pattern in after-school sports activities on self-esteem are presented as shown in table 5, 6, 7, 8.

**The Effects of Participation Pattern in After-school Sports Activities on Global Self-esteem**

As shown in Table 5, frequency ( $\beta=.17$ ), length ( $\beta=.11$ ), and degree of participation ( $\beta=.16$ ) all had significant positive effects on global self-esteem ( $F=5.24, p<.01$ ). The explanatory power of the regression model was 37.1% ( $R^2=.371$ ); all of the variables exerted a significant effect at the 99.9% level.

Table 5: Effects of Sports Activity Participation Patterns on Global Self-Esteem

Participation pattern	Global self-esteem				
	B	SE	$\beta$	t	
Constant	4.366	.166		17.285**	R <sup>2</sup> = .371, F = 5.24
Frequency	.254	.086	.171	2.804**	
Length	.309	.077	.114	2.152**	
Degree	.412	.065	.157	2.632**	
**p < .01					

**The Effects of Participation Pattern in After-school Sports Activities on Social-peers Self-esteem**

As shown in Table 6, frequency ( $\beta=.31$ ) and degree of participation ( $\beta=.19$ ) had significant positive effects on social-peers self-esteem ( $F=5.26, p<.01$ ). The explanatory power of the regression model was 29.0% ( $R^2=.29$ ), with the variables exerting a significant effect at the 99.9% level.

Table 6: Effects of Sports Activity Participation Patterns on Social-Peers Self-Esteem

Participation pattern	Social-peers self-esteem				
	B	SE	$\beta$	t	
Constant	3.353	.196		17.113***	R <sup>2</sup> = .29, F = 5.263**
Frequency	.212	.046	.314	4.613**	
Length	.065	.045	.097	1.441	
Degree	.178	.064	.192	2.759**	
**p < .01, ***p < .001					

**The Effects of Participation Pattern in After-school Sports Activities on Home-parents Self-esteem**

As shown in Table 7, the participation pattern in after-school sports activities did not have an effect on home-parents self-esteem, as evidenced by the model's exceedingly low explanatory power of 1.5% ( $R^2=.015$ ).

Table 7: Effects of Sports Activity Participation Patterns on Home-Parents Self-Esteem

Participation pattern	Home-parents self-esteem				
	B	SE	$\beta$	t	
Constant	2.849	.076		1.682	R <sup>2</sup> = .15, F=.831
Frequency	.012	.053	.020	.226	
Length	.062	.049	.112	1.245	
Degree	.025	.063	.036	.406	

**The Effects of Participation Pattern in After-school Sports Activities on School-academics Self-esteem**

As shown in Table 8, frequency ( $\beta=.37$ ), length ( $\beta=.34$ ), and degree of participation ( $\beta=.28$ ) had significant positive effects on school-academics self-esteem ( $F=7.56, p<.01$ ). The model explains 40.0% of the variance ( $R^2=.40$ ), and the variables were found to exert a significant effect at the 99.9% level.

Table 8: Effects of Sports Activity Participation Patterns on School-Academics Self-Esteem

Participation pattern	School-academics self-esteem				
	B	SE	$\beta$	t	
Constant	4.751	.196		18.162***	R <sup>2</sup> = .40, F = 7.564**
Frequency	.272	.056	.372	5.133**	
Length	.165	.054	.343	3.441**	
Degree	.248	.051	.275	3.659**	
**p < .01, ***p < .001					

**b. The Effects of Participation Pattern in After-school Sports Activities on School Adjustment**

The results of participation pattern in after-school sports activities on school adjustment are presented as shown in table 9, 10, 11.

**The Effects of Pattern of Participation in Sports Activities on Rule-abiding behavior**

As shown in Table 9, frequency of participation ( $\beta=.108$ ) had a significant positive effect on rule-abiding behavior ( $F=2.116, p<.05$ ). The model explained 23.0% of the variance ( $R^2=.23$ ), and all of these variables exerted a significant effect at the 99.9% level.

Table 9: Effects of Sports Activity Participation Patterns on Rule-Abiding Behavior

Participation pattern	Rule-abiding behavior				R <sup>2</sup> = .23, F = 2.116*
	B	SE	$\beta$	t	
Constant	3.997	.188		21.315***	
Frequency	.005	.057	.108	.292*	
Length	-.063	.053	-.107	-1.194	
Degree	-.052	.067	-.069	-.778	
*p < .05, ***p < .01					

**The Effects of Participation Pattern in After-school Sports Activities on Relationships with Teachers**

As shown in Table 10, subjects' participation pattern had no significant effect on students' relationship with teachers, as evidenced by the model's low explanatory power of 6% ( $R^2=.06$ ).

Table 10: Effects of Sports Activity Participation Patterns on Relationship with Teachers

Participation pattern	Relationship with teachers				R <sup>2</sup> = .16, F = 1.502*
	B	SE	$\beta$	t	
Constant	3.892	.214		18.199***	
Frequency	-.038	.065	-.051	-.580	
Length	.005	.060	.007	.082	
Degree	-.042	.076	-.049	-5.48	
*p < .05, ***p < .01					

**The Effects of Participation Pattern in After-school Sports Activities on Peer Relationships**

As shown in Table 11, frequency ( $\beta=.13$ ) and length of participation ( $\beta=.18$ ) had significant positive effects on students' peer relationships ( $F=5.50, p<.001$ ). The explanatory power of the regression model was 39.0% ( $R^2=0.39$ ), and these variables were both found to exert a significant influence at the 99.9% level.

Table 11: Effects of Sports Activity Participation Patterns on Peer Relationships

Participation	Peer relationships				R <sup>2</sup> = .39, F = 5.495***
	B	SE	$\beta$	t	
Constant	4.275	.185		16.779	
Frequency	.171	.059	.134	1.494*	
Length	.111	.055	.176	2.116*	
Degree	.002	.070	.014	.035	
*p < .05, ***p < .01					

**IV. DISCUSSION**

The purpose of the present study was to identify the effects of participation in after-school sports activities on self-esteem and school adjustment of adolescents from multicultural families in South Korea. Our discussion based on the study findings is as follows.

First, students' participation status in after-school sports activities had a significant effect on some aspects of self-esteem and school adjustment among students from multicultural families. Specifically, the global, social-peers, and school-academics self-esteem of students who participated in after-school sports activities were higher than were those of their non-participating counterparts. This finding is consistent with reports

that those individuals who play sports tend to have a greater level of self-esteem than do individuals who do not play sports<sup>10</sup>. Our finding was also partially supported by a report on the relationships of after-school sports activity participation with gender role identity and self-esteem<sup>13</sup>.

Park<sup>10</sup> reported that subdomains of self-esteem concerning relationships with family, peers, and teachers exhibited higher scores among students who participated in after-school sports activities as compared to those who did not. Such findings appear to be attributable to the fact that participation in sports promotes cooperation, a positive view of one's body, and acquisition of the necessary skills and athleticism, which subsequently contribute to emotional stability, improved satisfaction, and a positive self-image.

Kim<sup>5</sup> argued that participation in sports provides children with opportunities to cultivate close friendships while cooperating with and competing against one another. Jung added that sports participation encourages children to follow rules in working towards a common goal, which cultivates a sense of responsibility. The current study also noted that students who participated in after-school sports activities exhibited a significantly greater level of rule-abiding behavior and healthier peer relationships, thus supporting Jung's findings. Furthermore, the higher levels of self-esteem and school adjustment observed among students from multicultural families who participated in after-school sports activities in the present study clearly suggests that the previously identified benefits of sports participation extend to students from multicultural families. As such, participation in after-school sports activities must be actively promoted among children and adolescents from multicultural families in South Korea in order to encourage healthy school adjustment and self-esteem among them.

Second, the participation pattern in after-school sports activities partially influenced the self-esteem of students from multicultural families. More specifically, the frequency and degree of participation had significant positive effects on global, social-peers, and school-academics self-esteem. This finding suggests that the frequency and degree of participation in after-school sports activities determines the strength of their positive effect on self-esteem. Despite many opportunities to mingle with their peers, students from multicultural families often fail to forge meaningful peer relationships because of prejudice and discrimination<sup>11</sup>. One of the unique advantages of sports is that they give the opportunity for participants to physically interact for relatively short periods<sup>10,15</sup>. The active participation of students from multicultural families in sports activities can increase their opportunities to meet and interact with mainstream peers, which can in turn improve mutual understanding and cultivate a sense of shared sentiment, thereby strengthening their bonds. This is in a similar vein to Kim's findings<sup>5</sup>, which indicated that a sense of belonging and connection helps students from multicultural families to overcome feelings of alienation and loneliness.

Third, the participation pattern in after-school sports activities partially influenced the school adjustment of students from multicultural families. In particular, frequency of participation had a significant positive effect on rule-abiding behavior, whereas frequency and length of participation had significant positive effects on peer relationships. This finding suggests that students' frequent participation in sports activities promotes internalization of rule-abiding behavior, which subsequently transfers into the school context<sup>16,17</sup>. This supports the previous finding that students' tendency to abide by the rules increases with their frequency of sports participation, and this greater rule-abiding behavior in turn leads to better school adjustment overall<sup>5,8,9,18,19</sup>. The results also suggest that participation in after-school sports activities increases opportunities for students from multicultural families to interact and forge relationships with other students, and that the longer these relationships persist, the more beneficial they become.

In sum, it would appear that a highly effective way for students from multicultural families to cultivate positive peer relationships is participation in after-school sports activities. Furthermore, peer interaction through sports seems to have a positive effect on the school adjustment of students from multicultural families. Follow-up studies are needed to explore institutional measures at the community level towards improving such students' self-esteem and school adjustment. In this regard, research on various sports programs designed to help these students would be beneficial.

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# Effects of IT System Acceptance and Utilization on Quality, Cost, Flexibility, and Development Performance: Focused on Small and Medium Enterprises

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## Abstract—

SMEs form the bedrock of the national economy and serve as a foothold for job creation and strengthening the industrial foundation. Developed countries have directed efforts to changing the industrial ecosystem to one that is oriented around SMEs rather than large businesses. Through such efforts, they are aiming to promote an economic ecosystem that is based on the diversification of SMEs. SMEs, however, tend to have limited resources in terms of funds, manpower, technology and information, and lack the ability to systematically manage such resources, and so the question of whether to adopt IT systems is a major management decision. Until now, most academic studies about IT system implementation and utilization have discussed the benefits of adopting IT systems for businesses in general, without considering the unique situation of SMEs. IT system implementation has been regarded as an antecedent factor for improving productivity in the long term regardless of financial measures, leading to enhanced decision-making quality, increase in information sharing, reduction of lead time, and improvements in innovation capacity and product and service quality. Given the unique situation facing SMEs, this study has conducted a research on IT system acceptance and utilization in SMEs on firm performance. The analysis of the data secured from the auto and machinery industry shows that IT acceptance in SMEs had a positive effect on development performance and that IT utilization in SMEs had a significant positive effect on quality, cost, flexibility, and development performance. Through these results, the study has discussed theoretical and practical implications, limitations of the study, and future research plans, etc.

**Keywords---** Small and Medium Enterprises, IT System, IT System Acceptance, IT System Utilization, Firm Performance.

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## I. INTRODUCTION

From the mid-1990s, South Korea began introducing IT systems—an important tool for management innovation—centering mainly around large corporations. Recently, with the expansion in government support for IT system implementation and the growing interest of businesses in adopting IT systems, small and medium enterprises (SMEs) are beginning to follow suit. SMEs that are in a relatively weaker position compared to large conglomerates in terms of organization and scale, management technique, information mindset and budget, are beginning to understand the necessity of implementing IT systems, and are seeking ways to improve productivity and achieve management innovation through such.

Research on the corporate performance of businesses that have adopted IT systems show disparate results in the quantitative analysis of easily measurable productivity indices, such as return on assets, return on investment, asset turnover and return on sales<sup>1</sup>. However, this does not mean that IT investments reap no benefits, but that it takes time for IT investment payoffs to translate into quantifiable results, and its impact on corporate performance may differ depending on factors, such as organizational structure, corporate culture, proficiency level of employees and employee training<sup>1,2</sup>.

Atkinson and McKay<sup>3</sup> analyzed diverse industries and businesses in different countries, and were able to verify that, in general, IT investments contribute to productivity improvement. IT system implementation has been regarded as an antecedent factor for improving productivity in the long term regardless of financial measures, leading to enhanced decision-making quality, increase in information sharing, reduction of lead time, and improvements in innovation capacity and product and service quality<sup>3,4</sup>.

SMEs are the backbone of the Korean economy, accounting for 99.9% of the total number of businesses and 76.2% of the total number of workers as of 2013. As such, raising the productivity of SMEs is an important factor in enhancing national competitiveness. SMEs form the bedrock of the national economy and serve as a foothold for job creation and strengthening the industrial foundation. Developed countries have directed efforts to changing the industrial ecosystem to one that is oriented around SMEs rather than large businesses. Through such efforts, they are aiming to promote an economic ecosystem that is based on the diversification of SMEs<sup>5</sup>.

It is important to encourage SMEs to voluntarily engage in efforts for product and service innovation and enhancing efficiency in business operations, to enable them to gain a competitive edge in the industry<sup>6</sup>. If SMEs are to overcome the limitations of resources and capacity, as well as improve efficiency of business management and business performance, an understanding and systematic use of IT systems is imperative<sup>7</sup>.

Many SMEs are contemplating IT system implementation. Until now, most academic studies about IT system implementation and utilization have discussed the benefits of adopting IT systems for businesses in general, without considering the unique situation of SMEs. Organizational theory and practice for large businesses may not apply to SMEs, and so the need for research on SMEs specifically has been raised continuously,

The purpose of this study is to present a model showing how the acceptance and utilization of IT systems, which SMEs are adopting to improve business performance, affect the company's quality performance, cost performance, flexibility performance and development performance, as well as examine this model through empirical studies. Based on this, we seek to provide basic data for devising measures to strengthen the competitiveness of SMEs through IT system utilization.

## II. THEORETICAL BACKGROUND

### A. *Scope and Criteria of SMEs*

The scope of SMEs varies between country. In Europe, it is defined as a company employing less than 250 regular workers and with sales figures of less than 50 million euro. In Korea, an SME is defined as a company with three year average annual sales figures of less than 60 billion won in the case of a service business, and 150 billion won in the case of a manufacturing business (different depending on the type of business)<sup>5</sup>.

Compared to large corporations, SMEs are smaller in size in terms of capital, sales and human resources. They also lack information-sharing capabilities, and therefore have unclear strategies for responding to the external environment<sup>8</sup>. To overcome the limitations of resources and capacity of SMEs, and improve efficiency and effectiveness of business management, efforts to increase productivity through IT system implementation are essential<sup>9</sup>.

### B. IT System Adoption Utilization in SMEs

The Korean government has been implementing policy initiatives for the past 15 years since 2000 to promote the competitiveness of SMEs through IT system implementation. As a result, the number of SMEs adopting IT systems has been on the rise, but the actual utilization of IT systems has fallen. According to the Small and Medium Business Administration <sup>10</sup>, qualitative utilization of IT systems in large corporations is 71.6 points (out of 100 points), whereas it is only 42.2 points in SMEs, which shows that actual IT system utilization of SMEs is very low. Therefore, rather than indiscriminate adoption of IT systems, measures to promote its utilization is necessary.

In this respect, it is important to conduct research focusing on ways to increase IT system utilization in SMEs. SMEs that have failed to actively utilize IT systems after implementation report little improvement in business performance compared to investment costs, and this adversely affects IT system acceptance, which in turn discourages them from making reinvestments, creating a vicious cycle <sup>11</sup>.

Some of the earlier studies about IT system adoption and utilization include identifying key success factors for improving business performance (both financial and non-financial measures) <sup>7</sup>; moderating effects of IT system factors for improving business performance based on industry and company characteristics <sup>12</sup>; and key organizational issues arising from IT system adoption <sup>13</sup>. In these earlier studies, the effects of IT system implementation were measured mainly focusing on large companies, and the key success factors that can help promote IT system utilization had mainly to do with the IT system, investment-related factors and organization members using the system.

SMEs tend to have limited resources in terms of funds, manpower, technology and information, and lack the ability to systematically manage such resources <sup>14</sup>, and so the question of whether to adopt IT systems is a major management decision. Therefore, it is important to conduct studies on how IT system acceptance and utilization impacts business performance, and provide SMEs with basic data and information about the implications of IT system adoption and utilization, thus helping them make more effective decisions.

### III. STUDY DESIGN

The purpose of this study is to present a model showing how the acceptance and utilization of IT systems, which SMEs are adopting to improve business performance and gain a competitive edge, affect the company's quality performance, cost performance, flexibility performance and development performance, as well as examine this model through empirical studies.

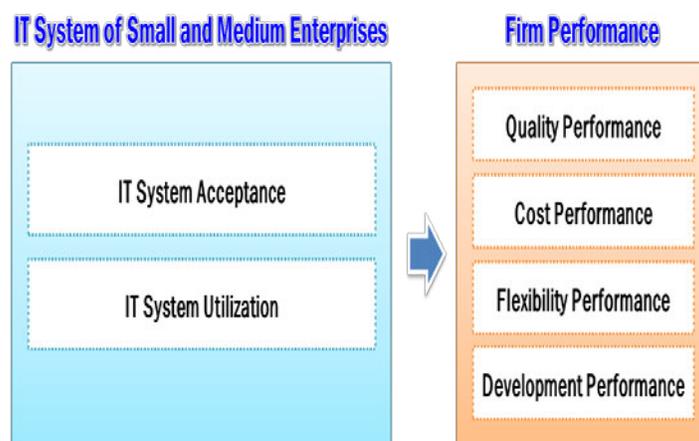


Figure 1: Research Model

As shown in Figure 1, the paper sets out to identify the relationship between the latent variables in the business performance of SMEs that are affected by IT system acceptance and utilization. Unlike previous studies, which examined the impact of IT system adoption on business performance for companies in general without consideration of the unique situation of SMEs, we aim to verify the impact of IT system acceptance and utilization on business performance in SMEs specifically.

IT systems can analyze various internal and external data and improve processes to increase productivity <sup>15</sup>. Miles' <sup>7</sup> study states that it is possible to strategically improve processes through IT system adoption and utilization, while the study by Chen et al. <sup>16</sup> claims that big data technology—a hot issue these days—can help reduce unnecessary processes by monitoring the company's main activities real-time. Also, IT systems can systematically analyze and provide the necessary information to management, thus helping them make effective decisions in a rapidly changing business environment <sup>7</sup>.

Previous studies on variables affecting IT system utilization identified as important factors organizational culture and atmosphere, organizational structure and management support <sup>17</sup>. That is, the characteristic of the organization (understanding of the business environment, willingness to accept IT system) can increase IT system user satisfaction and its utilization level, thus contributing to improved business performance.

Based on the assumption that IT system acceptance and utilization in SMEs can produce positive synergistic effects on improving business performance as found in previous studies, this paper presents the following hypotheses.

H1: IT acceptance in SMEs will have a positive effect on business performance (quality, cost, flexibility, development performance).

H2: IT utilization in SMEs will have a positive effect on business performance (quality, cost, flexibility, development performance).

#### IV. RESULTS AND ANALYSIS

##### A. Characteristics of Sample

The study population was SMEs in the manufacturing industry, including the auto and machinery industry. The survey was conducted as part of the panel survey of the productivity of the manufacturing industry carried out by the Ministry of Trade, Industry and Energy and the Korea Productivity Center.

Table 1: Number of those Surveyed by Personal Background

Classification		Sample size	%	
Age	<= 10 years	303	55	18.2
	> 10 years		139	45.9
	> 20 years		68	22.4
	> 30 years		28	9.2
	> 40 years		13	4.3
Listed	KOSPI	303	3	1.0
	KOSDAQ		13	4.3
	External audit		85	28.1
	unlisted		202	66.7
Industry	Auto	303	122	40.3
	Machinery		181	59.7

A total of 601 responses to questionnaires was collected. Among them 303 were SMEs in the auto and machinery industry, and their responses were analyzed. SPSS 18.0 and AMOS 20.0 were used for statistical analysis.

Table 1 is a summary of the characteristics of the sample that participated in the survey. It shows that only 4.3% of the companies are over 40 years old, which means that most of the SMEs in the survey are established after 1980. Among the SMEs, 66.7% are unlisted, 28.1% are subject to external audit, 4.3% are listed on KOSDAQ and 1.0% listed on KOSPI, while 40.3% are in the auto industry and 59.7% in the machinery industry.

##### B. Convergent Validity and Discriminant Validity

This study has applied a two-step approach, a method generally used for analyzing structural equation model. This phased approach has its merits: it clearly shows how potential variables are reflected in individual measurement questions while avoiding unnecessary interactions between research models and measurement models<sup>18</sup>.

In step one, we conducted a factor analysis of the measurement model, and verified convergent validity and discriminant validity of potential variables extracted. In step two, we verified the causal relationship between potential variables extracted from the confirmed measurement model using the path coefficient of the research model.

**Table 2: Measurement Model-Convergent Validity**

Concept	Measured Variable	SR	SRW	Standard Error	C.R.	SMC	AVE	Cronbach'α
IT System Acceptance	IT System Acceptance1	0.980	0.912	0.036	27.344	0.832	0.778	0.901
	IT System Acceptance2	1.002	0.954	0.032	30.929	0.911		
	IT System Acceptance3	1.000*	0.926	-	0.000*	0.858		
IT System Utilization	IT System Utilization1	1.000*	0.841	-	0.000*	0.707	0.713	0.802
	IT System Utilization2	1.168	0.959	0.164	7.118	0.920		
Quality Performance	Quality Performance1	1.000*	0.900	-	0.000*	0.810	0.660	0.818
	Quality Performance2	1.003	0.898	0.047	21.385	0.806		
	Quality Performance3	0.924	0.840	0.048	19.421	0.706		
Cost Performance	Cost Performance1	1.000*	0.778	-	0.000*	0.606	0.516	0.670
	Cost Performance2	1.053	0.825	0.081	12.954	0.680		
	Cost Performance3	0.878	0.787	0.069	12.767	0.620		
Flexibility Performance	Flexibility Performance1	1.000*	0.847	-	0.000*	0.718	0.649	0.810
	Flexibility Performance2	1.112	0.872	0.059	18.734	0.760		
	Flexibility Performance3	1.107	0.904	0.057	19.442	0.817		
Development Performance	Development Performance1	0.943	0.810	0.056	16.871	0.656	0.616	0.825
	Development Performance2	1.057	0.880	0.055	19.21	0.775		
	Development Performance3	1.034	0.893	0.053	19.608	0.797		
	Development Performance4	1.000*	0.842	-	0.000*	0.709		
Model Fit		χ <sup>2</sup> =180.279, df=120, p=0.000, CMIN/DF=1.502, GFI=0.941, AGFI=0.916, CFI=0.984, RMR=0.050, RMSEA=0.041, NFI=0.954, IFI=0.984						

To measure convergent validity and internal consistency, composite reliability and average variance extracted (AVE) were applied in this study<sup>19</sup>. Composite reliability, at 0.670 - 0.901, is higher than 0.5 and 0.6, which is the lowest standard level and the usual standard level, respectively, which indicate internal consistency of measurement questions. The AVE of individual potential variables, at 0.516 - 0.778, also exceeds the standard level of 0.5. As both construct reliability and AVE calculated using all of the measurement indices presented in this study are higher than the standard level, this model can be justifiably said to have internal consistency and convergent validity<sup>20</sup>. Table 2 presented information about measurement questions and convergent validity shown in the full model.

**Table 3: Discriminant Validity Result**

Classification	IT System Acceptance	IT System Utilization	Quality Performance	Cost Performance	Flexibility Performance	Development Performance
IT System Acceptance	0.949					
IT System Utilization	0.018	0.896				
Quality Performance	0.003	0.02	0.904			
Cost Performance	-0.055	-0.066	0.028	0.819		
Flexibility Performance	0.112***	-0.087**	-0.338***	0.021	0.900	
Development Performance	0.257***	-0.134***	-0.143***	0.089**	0.261***	0.908
*:p<0.1, **:p<0.05, ***:p<0.01 Correlation among each components, and diagonal component Sqrt(AVE)						

As a result of the measurements of various components using multiple measurement questions, discriminant validity was secured where there was low correlation between the results of measurements of a variety of components<sup>21</sup>. Fornell and Larcker<sup>20</sup> proposed an approach under which correlation coefficients between the sqrt (AVE) of measurement questions for each variable and potential variables can be compared. As for all the components presented in this study, verification was made by comparing the correlation between the sqrt (AVE) of relevant components and other components individually. According to the table showing analysis results, the sqrt (AVE) of all the components presented turned out to be greater, leading to a conclusion that discriminant validity was secured. Table 3 is a summary of the results of an analysis.

**C. Verification of Research Model**

In order to verify the explanatory power of these theoretical research models based on data, we came up with various Model Fit Indices for research models as shown in Table 4.

Research models presented as absolute fit indices (p-value 0.065, GFI 0.950, RMSEA 0.026), incremental fit indices (NFI 0.964, IFI 0.994, TLI 0.992, CFI 0.994), and parsimonious fit indices (AGFI 0.929,  $\chi^2/df$  1.202) demonstrate good fit with all the model fit indices exceeding standard levels. Therefore, the research model presented can be justifiably said to be a stable and highly reliable model from the theoretical perspective of structural equation models<sup>19</sup>.

Table 4: Model fit for Research Model

Fit indices	Standard Level	Research model
Absolute fit indices		
Chi-Square test statistic( $\chi^2$ )		144.243
Degrees of freedom		120
p-value	> 0.05	0.065
Goodness-of fit index(GFI)	> 0.90	0.950
Root mean square residual(RMR)	< 0.05	0.072
Root mean square error of approximation(RMSEA)	< 0.05	0.026
Incremental fit indices		
Normed fit index(NFI)	> 0.90	0.964
Incremental fit index(IFI)	> 0.90	0.994
Turker-lewis index(TLI)	> 0.90	0.992
Comparative fit index(CFI)	> 0.90	0.994
Parsimonious fit indices		
Adjusted goodness-of-fit index(AGFI)	> 0.90	0.929
Normed chi-square( $\chi^2/df$ )	< 2.00	1.202

Table 5 shows the results of the final analysis of the research models using structural equation models. Hypothesis 1 concerned whether IT system acceptance in SMEs will have a positive effect on firm performance. The results of verifying research models show that IT system acceptance in SMEs had no significant effect on quality performance ( $\beta=-0.052$ ,  $p>0.10$ ), cost performance ( $\beta=0.067$ ,  $p>0.10$ ), and flexibility performance ( $\beta=-0.015$ ,  $p>0.10$ ), while having significant impact on development performance ( $\beta=0.184$ ,  $p<0.01$ ).

Hypothesis 2 concerned effects of IT utilization in SMEs on firm performance. It was found that IT utilization in SMEs has had a significant positive effect on quality performance ( $\beta=0.074$ ,  $p<0.10$ ), flexibility performance ( $\beta=0.093$ ,  $p<0.01$ ), and development performance ( $\beta=0.072$ ,  $p<0.05$ ) while having no effect on cost performance.

Table 5: Summary of Hypotheses Testing

Hypothesis	Causal Relationship			$\beta$	S.E.	t	Judgment
H1a	ITSystem Acceptance	→	Quality Performance	-0.052	0.054	-0.971	Dismissal
H1b	ITSystem Acceptance	→	Cost Performance	0.067	0.041	1.627	Dismissal
H1c	ITSystem Acceptance	→	Flexibility Performance	-0.015	0.044	-0.331	Dismissal
H1d	ITSystem Acceptance	→	Development Performance	0.184***	0.047	3.897	Adoption
H2a	IT System Utilization	→	Quality Performance	0.074*	0.038	1.952	Adoption
H2b	IT System Utilization	→	Cost Performance	0.015	0.029	0.514	Dismissal
H2c	IT System Utilization	→	Flexibility Performance	0.093***	0.032	2.940	Adoption
H2d	IT System Utilization	→	Development Performance	0.072**	0.033	2.181	Adoption

## V. CONCLUSION

This study examined the impact of IT system acceptance and utilization in SMEs on firm performance. given unique management environment facing SMEs. The earlier studies have discussed the effects of adopting IT systems for all businesses in general with no regard for the unique situation of SMEs, and that often led to unusual results due to the lack of detailed approach. So this study approached IT system acceptance and utilization which has been conceptualized from an SME perspective and looked at its structural relationship with firm performance.

The results of analysis of this study can be summed up as follows. Firstly, IT acceptance in SMEs had an impact on improving development performance. Secondly, IT system utilization in SMEs had an effect on quality, flexibility, and development performance. The study also found that IT system acceptance and utilization in SMEs had no significant effect on their cost performance.

This paper has discussed the following theoretical implications. It presented a conceptual model for the structural relationship between key antecedent factors that improve corporate performance of SMEs. The study also verified the effects of IT system acceptance and utilization, which had been approached from the perspectives of large corporations, from the viewpoint of SMEs.

Practical implications can be drawn from that. The study verified that IT system acceptance and utilization in SMEs had a significant positive impact on firm performance. In fact, among many SMEs with IT systems in place, quite a number of them saw their systems not working as expected due to resultant organizational innovation, the redesign of company-wide business process or lack thereof. In particular, SMEs recklessly set up an IT system without engaging in separate business process reengineering. As a result, despite massive investments, a number of problems arose, such as a lack of IT system integration and compatibility, overlapping materials, and insufficient support for business strategies. As such, if SMEs fail to recognize ways to continuously utilize IT systems after adopting them that would generate poor firm performance relative to the investment made, which in turn would have a negative impact on IT system acceptance making them reluctant to reinvest their profits.

Despite that, the adoption and utilization of IT systems in SMEs is becoming ever more important as a key strategic tool in securing competitive edge, and has been considered an antecedent factor for enhancing firm performance in the long term. As SMEs have limited resources and organizational capability, efforts to grasp the essence of the IT systems and to enhance the organization's internal capabilities are prerequisite. SMEs need to retain experts with abundant knowledge and experience in corporate workflow, manufacturing process, and manufacturing IT system to operate their IT systems adequately. That makes it important to utilize competent internal human resources or seasoned external consultants important appropriately.

This study's limitations and future research tasks are as follows. It is limited to SMEs included in the line process (auto, machinery) industry. IT systems, which so far have been considered in an integrated manner, should be applied differently based on different processes that can vary based on industry characteristics. In order to develop an IT acceptance and utilization system based on industrial characteristics, and by doing so, to encourage improved long-term firm performance, careful consideration and analysis is needed to identify what obstacles SMEs face in implementing IT systems. Also, to identify the disparate characteristics of individual processes, a comparative study should be conducted on the other processes that have yet to be addressed, an area which we intend to delve into in our future studies.

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# Hybrid Harris Corner Detection Algorithm and Deblurred Image Using PSO with Fast Subspace Clustering for Partial Duplicate Mobile Search

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## Abstract---

The smart phones and tablets are used by the rising popularity and it is planned to used mobile phone as most important internet access points ever since 2012. Edge-SIFT detection technique is used to give extremely dependant location, scale and orientation clues, it will decrease the registration error. On the other hand, in the existing work the identification of the corner points is difficult and it is resolve by the previous method namely Harris corner and Edge-SIFT algorithm (HC-ESIFT). Despite the fact that, in the previous work has trouble with deblurred image and calculation of very important discriminative bins. In addition, it is not proficient for optical phrase creation. Therefore, to solve this troubles, in the proposed work the Particle Swarm Optimization (PSO) for unclear image and Hybrid Harris Corner Detection (HHCD) methods is used to generate high quality of image by decreasing the unnecessary points in the edges. To improve the exact result of edge detection appreciably there are three methods are mainly used namely Harris operator and Susan operator and finally HHCD algorithm. In the present work, at first the Edge SIFT (ESIFT) method is used to take out the dependable edges of local image patches. After this process, the Edge SIFT method is applied to the HHCD algorithm to local patches. Regularize the image patches and take out the binary edge maps using PSO algorithm. The intended of HHCD algorithm is to give the most important data by choosing a main feature from images. By using the Radical Basis Kernel Function (RBF) the important bins are chosen and the uniqueness of lookup table is measured. To rescue the fast image the Subspace Clustering (SC) method is used and it is proficient for visual work generation. Therefore, the final outcome proves that the present SC-ESHIFT method improving the edge detection outcome for scalable unfair replacement mobile investigates.

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## I. INTRODUCTION

Now days, the smart phones and tablets are used by the rising popularity and it is planned to use mobile phone as most important internet access points. These mobile devices commonly supply the cameras which become one of the most natural and suitable portals from the physical space to the digital world. Therefore, the ever-present access to both the digital photo and network sheds bright light on more number of developing applications based on mobile image search. For example, validate the unique images between the visual media possessions and the user can accepted the online to discover useful data like reviews or discounts on the mark. This kind of application requires an efficient and scalable Content-Based Image Retrieval (CBIR) [1]. It is used to robotically take out the visual parameters such as colour, shape, texture and spatial information of the entire image in the database based on the pixel values and stored in the different database within the model called feature database [2, 3]. In computer vision, the local image patch descriptors is a very popular tool and it used to recognize the object, face verification, image stitching, image retrieval and face alignment. Now a day, the binary key point descriptors [4, 5] observe the significant interest as they require less storage and give faster matching times differentiated to descriptors that encode the patch presence as a vector of original numbers.

From Lindeberg [6], the edge detection method is developed for the particular work. A list of gradient orientation histograms are comprised by the edge descriptors, every edge is calculated in a specified region. Edges are linked by estimating each voxel in scale space, applying it an orientation and connecting neighbour voxels if their locations and orientations are adequately secure. Every location by the side of the edge is applied a position, scale, orientation and edge potency. This process is used to the result of the detector to focus characteristics and improve invariant descriptors.

Bag-of-visual-words (BoW) method is encouraged by document classification in word analysis and has been effectively assigned to analyse within the domain descriptions. In the existing visual search method accept the structure of Bag of Words and this text point to, quantized codes of visual features. Only one image is represented by the BoW as group of visual words available in the image [7]. To improve the local descriptors and corner detection points, the SIFT detector is used.

The SIFT detector and descriptors are choose for the following reasons. At first, the SIFT detector is scale invariant, rotation and translation and it is the stage of invariance wanted for our applications. Secondly, the general differentiation with some other local descriptors initiate that the SIFT descriptors performed in best manner in an image matching task [8]. To enhance the performance, corner detection is performed in image processing and hence more number of corner detectors has been available.

The techniques are observed to search for to recuperate the real in image deblurring, sharp image by using a arithmetical model of the blurring process. The main trouble of the blurred image is some of the information's are hidden or lost and this is possible to resolve this trouble is only the person knows the details of the blurring process. For denoising the image common methods are introduced like Gaussian and median filtering [9]. After that, the effective and consistent algorithms implemented for recollecting the data as potential from the already available data. It means unsatisfactory data. Significantly, it access to take out the highest data in cases where it is expensive or even not possible to acquire an image without blur like astronomical or medical images. In the environment it has some major applications like barcode readers used in the department store and by transporting the organization must be capable to reimburse for imperfections in the scanner optics.

Normalize the image patches based on the scales and orientation of the specified points into a fixed scale and orientation for edge map extraction. At this point, the alterations in the signal with patch movement are calculated using the local auto-correlation function in various directions. After that, the edge map is decomposed into a various sub-edge maps, corresponding to the direction of edges. To create the Edge-SIFT more compressed and to enhance the efficiency of uniqueness calculations, recommend to compact it. In the proposed work, the radial basis kernel function is introduced to choose the useful information bins and the related kernel value among the images is labelled. By using the subspace clustering process the Visual vocabulary tree is created with the same calculations is used for efficient visual word generation.

## II. BACKGROUND KNOWLEDGE

The Geometry-preserving visual Phrases (GVP) technique is introduced by Zhang et. Al [10]. This method is used to encode the most important spatial data into Bag-of-Visual-word (BoV) form and it is sufficient to be assigning to large scale databases. This technique increases the storage facility and also the computational difficulty. Fisher kernel method is suggested by Jagou et, al [11] to aggregate the local feature. This kind of method is demonstrated to yield good performance and it correctness the leftovers aggressive still following an important dimensionality lessening to 128 dimensions. It means the similar size as an only one SIFT vector. After that, it using the asymmetric product quantization methodology for the vector density part and together optimizing the dimensionality lessening and density.

The "Holistic" method introduced by Lazebnik et.al [12] for classification of the image based on the alteration on the pyramid match kernels. This method is used to divide the image into a sub-regions and calculating histograms of local features identified within the every sub-region. The outcome of "spatial pyramid" is very easy and computationally efficient extension of an order less bag-of-features image representation, and it demonstrated considerably enhance the performance on trouble of scene classification responsibility.

Kernel based classification technique is introduced by Grauman et.al [13] and it associates disqualified features sets to multi-resolution histograms and calculates a weighted histogram connection in this space. This computation followed by "Pyramid match" is linear in the number of features, and it absolutely identifies the histogram cell where a common pair first presents. Because the kernel method does not reprimand the appearance of additional features, it is automatically to clutter. This technique demonstrated the kernel process is positive-definite, creating it valid for used in learning algorithms whose absolute result are certain only for Mercer kernels. On the other hand, it has troubles with system complexity.

Raw contour-based matching algorithm is introduced by Cao et.al [14] for large scale sketch based image search. It is used to estimate the uniqueness among a sketch query and natural images, and create sketch-based image rescue scalable to millions of images. This method is used to improve the accuracy and efficiency. However, it has troubles for estimate adjacent search. It gives an exact estimation of the Euclidean distance. This method is also used to give efficient search quality and memory usage for the scalable data. On the other hand, this methodology has trouble by the side of with the quantization fault in some cases and costly situation.

The corner detection method is introduced by Mair et. al [16]. Corners are preferred cues owing to their two dimensional constraints and speediest methods to identify them. Now a days, a new corner detection method is very speed, has been presented which does not perform the existing algorithms in both computational performance and continuity. On the other hand, to get a good quality of images is very difficult for large scale dataset. The hybrid k-means algorithm for a good image recovery is introduced by Chaurasua et al [17]. In the previous Linde-BuzoGray (LBG) method the K-means algorithm is applied for codebook of images. By using the K-means clustering algorithm the LBG codebook efficiency is improved. A global codebook of query images is generated for every stage by arbitrarily choosing 5, 10 and 15 query images from every stage. This process is decrease the time complexity. In the present algorithm efficiently decrease the unwanted outcome and provide a better relevance percentage by providing less number of unwanted images.

The feature extraction based lookup table for automatic image rescue process is discussed by Yang et.al [18]. It anticipated the speed feature extraction method which is based on the mobile. In the lookup table based feature extraction there are three histograms are extracted and this is based on the colour distribution and the position of the distribution. After that, it uses the algorithm to mobile phone. There are three types of quires namely query-by-image, query by-colour, and query-by-blob. Finally, the outcome of this process proves that this method is very speed and constant mechanism sufficient to use on mobile platform. The fast indexing method is introduced by Cheng et.al [9] for image retrieval and it is mainly based on the rule of axis analysis. In a specified image the feature vectors are commanded by the rule of analysis to fast up the uniqueness search in a high-dimensional image in the database using a k closest adjacent validation. The trouble of high-dimension feature histogram is the feature space is effected from the high index and retrieval price, is also resolved by the present methodology. It enhances the system performance in terms of the retrieval accuracy and retrieval speed.

### III. PROPOSED METHODOLOGY

By using the PSO algorithm the deblurred images have been solved absolutely [20]. This process is illustrated in figure 1. In this method, the blurred images are altered into high quality images by using efficient methodologies. At first, to take out the image patches within the specified range. The Hybrid Harris corner works based on the local auto-correlation function, it is performed. At this point, the alteration in the signal with patch shift is calculated using local auto-correlation function in various directions. To create Edge-SIFT execute automatically to registration faults and it is produced by inaccurate point of localization affine transformations and so on. The edges are make bigger in every sub-edge to create edges in close by corresponding positions can be considered for uniqueness computation. The combination of consequential sun-edge maps is hence taken as the primary Edge-SIFT. It can be focused that the extracted initial Edge-SIFT are scrubby. It means more number of bits is 0 values. At the same methods as the feature selection method gather a data set, where the proper kernel value among the images are considered. Edge-SIFT are compressed. It means 384 bit, and are effective for correspondence calculation, wait for to obtain a compress and effective vocabulary tree is possible for mobile applications.

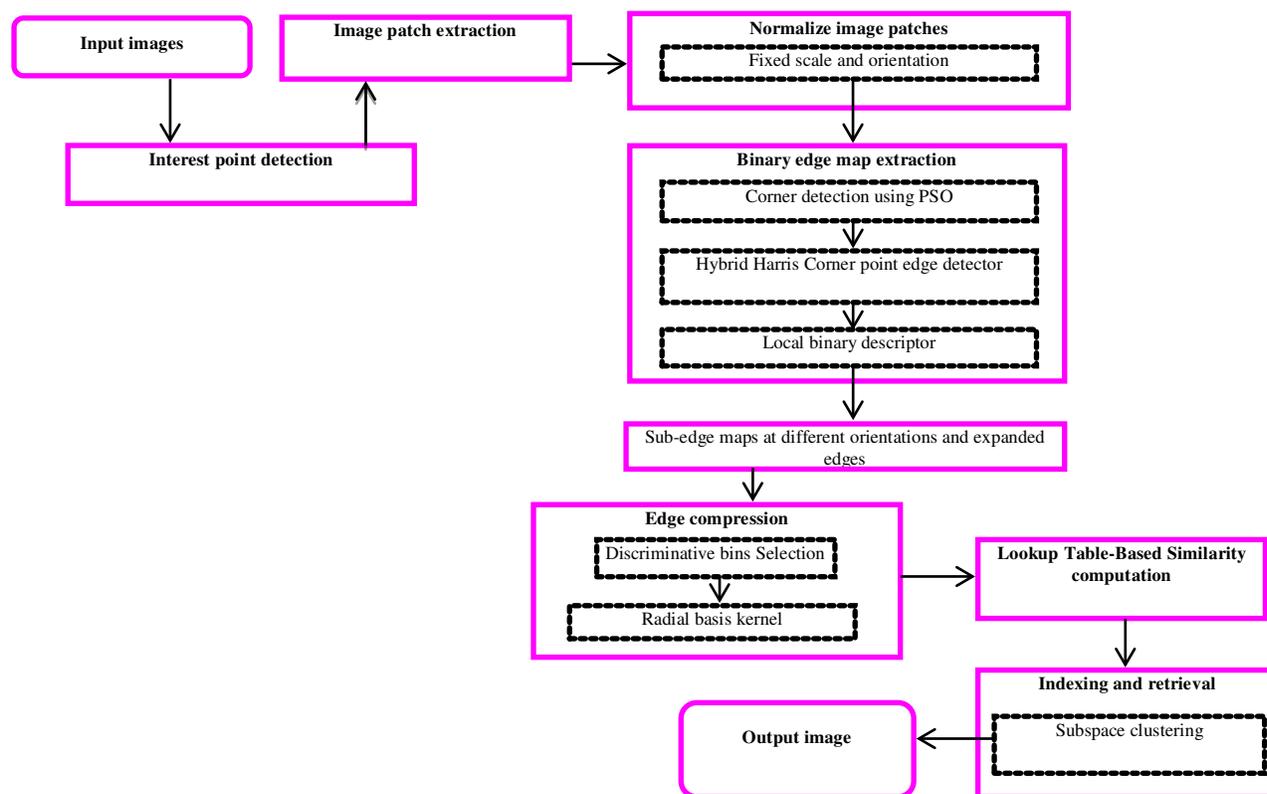


Figure 1: Proposed Edge and Corner Point based SIFT Extraction

#### A. PSO for Image Deblurring

Base on the camera movement the PSO algorithm is implemented and the blurred image for a picture with stable intensity in poses space. After that, the PSO algorithm is implemented for the present structures to efficiently calculate the weighted parameters. Every pixel or particles in the image represents an individual result to the optimization trouble of blurred image. The location to the pixel is prejudiced by the best pixel visited by it and the location of good pixel in its adjacent. While, the adjacent of a pixel is the all the swarm, the good location and the outcome of algorithm is referred to as a gbest PSO. At the same time, the little adjacent pixels is used, the algorithm is commonly referred to as local base (lbest) for PSO method. The performance of the every particle or pixel is calculated using the fitness function that differs based on the optimization trouble. The entire pixel is basically a data structure that hold the path of its present location  $x$  and its present velocity  $v$ . furthermore, entire pixels is "best" positions it has get in the previous calculations, represented as  $p_i$ . Between the entire pixels the best value is calculated and this is the global best location and

it is represented as  $p_g$ . at every time step, a pixel location and velocity is updated in the database by using the following formula:

$$v_{ij}(t + 1) = wv_{ij}(t) + c_1r_1(t)(p_{ij}(t) - x_{ij}(t)) + c_2r_2(t)(p_{gj}(t) - x_{ij}(t)) \quad (1)$$

$$x_{ij}(t + 1) = x_{ij}(t) + v_{ij}(t + 1) \quad (2)$$

In the above equations,  $j$  belongs to the limit  $1, 2, \dots, D$  and it is the size of the  $i \in \{1, 2, \dots, N\}$  and the dimensions of the space searched is represented as  $D$ . the initial weight is represented as  $w$  and the two positive constants are represented as  $c_1$  and  $c_2$ . The two random values are represented as  $r_1$  and  $r_2$  into the range  $[0, 1]$ . The focused blurred image  $B$  is the integral over the exposure time  $T$  and a number of examination noise  $N$ :

$$B = \int_0^T (K_t(d))dt + N \quad (3)$$

In common, a single blurry image has no chronological information connected with it.

$$B = \sum_{s=1}^S w_s K_s + N \quad (4)$$

The space is represented as  $S$ ; the equivalent parameters are represented as  $w_s$  which indicate the time spent at blur kernel  $K_s$ .

The aim of the function is measured by using given below formula

$$I(k) = \|\xi(\sum_{s=1}^S w_s K_s - \xi(B))\|^2 + \lambda \|w\|^2 \quad (5)$$

In the above equation the positive parameter is represented as  $\lambda$  to equilibrium the primary pixel and the second pixel,  $\xi$  is particular feature of gradients.

### Optimization by PSO

For each particle

Initialize  $x_i, v_i$

End

While convergence criteria is dissatisfied

For each particle

Evaluate the fitness of particle using (5)

Update lbest and gbest

For each dimension

Update velocity and position using (1) and (2)

End

End

End

While using PSO method to calculate the parameters, initially to find the fitness functions. By using equation (5) the fitness function is measured. Based on the largest intensity and minimum error value the local best and global best value is created. Consequently, it is used to give deblurred image with more quality. This quality of the image is used to improve the Peak Signal to Noise Rates (PSNR) in the available blurred image more accurately. The corner points are identified and the intensity of the pixel values of image is raised by using PSO algorithm by the side of largest PNR rate. PSNR value is measured by calculated the quality of restored image next to real image.

$$PSNR = 10 \log_{10} \left( \frac{Max_I^2}{\frac{1}{N_1 \times N_2 (\sum_{i=1}^{N_1} \sum_{j=1}^{N_2} (I(i,j) - \hat{I}(i,j))^2)}} \right) \quad (6)$$

The size of the image is equal to both the N1 and N2. The real image for estimating the quality of the different filters is represented as I and the image is acquired after assigning the respective filter is represented as  $\hat{I}$  and the highest potential intensity of the image is represented as Max.

**Interest Point Detection:** Force the method of SIFT to detect the interest point. There are three steps are needed to done this process and it is illustrated by Lowe [9].

1. Scale-space extreme detection: a sequence of DoG images with various scales is calculated. The model points in DoG images that are bigger or little than the entire 26 neighbours in both the present image and two nearest images in scale space are founded as individual interest points are extracted.
2. Keypoint localization: further precise interest point positions are fixed. For the time being, unbalanced points are removed.
3. Orientation assignment: central orientations of interest points are calculated by succinct the pixel gradients in their consequent image patches and choosing the important leading directions. Later than the detection of the interest point is completed then obtain the location, scale, and orientation of every interest point.

**B. Image Patch Extraction and Normalization**

At first, take out the image patches in the region of selected pointed based on the curiosity points. The extracted image patch size is based on interest point I is described as follows:

$$R_i = r \cdot scale_i \quad (7)$$

In the above equation the scale of an interest points is represented as scale. It can be grouping that, the highest r=2.5 in contact to highest image patches, the spatial clues and edges are available within this space. Therefore, it assists to increase the comparison of energy of the edge descriptor. On the other hand, highest r also raised the computation price.

**Edge Descriptor Computation:** consider the image patch size is D x D, at first use the canny detector [21] for edge map extraction for its competence and logically better performance.

**Hybrid Harris Corner Detection (HHCD) Algorithm**

The edge point is referred to as the Corner and the testing function power is very strong in several direction modified. It is the very important characteristic of the data. The correctness and quality of the corner detection in a straight line concern the outcome of the image processing, and can calculate the outline features and most information of the images [22]. In camera calibration, optical flow velocity measuring, movement calculation and positioning applications are used the corner detection process. It is the powerful tool for the image processing. Corner detection process cannot hold only the needed image information but also it can decrease the data redundancy and increase the detection process [23]. The Hybrid Harris Corner detection algorithm is used to improve the efficiency of the corner detection process. A hybrid Harris corner detection algorithm is increased by grouping the Harris and improved Susan operators. Initially, this process takes out the Harris and Susan corner feature points by using Harris and Susan operators. And then, the points are grouped together and manner weight calculation based on two weight coefficient SW.

**Harris Operator**

1. Gradient of pixels can be measured by convolution of gradient operator and image:

$$\begin{cases} X = I \otimes (-1,0,1) = \partial I / \partial X \\ Y = I \otimes (-1,0,1)^T = \partial I / \partial Y \end{cases} \quad (8)$$

2. Gradient of pixels can be measured by convolution of gradient operator and image.

$$M = \begin{bmatrix} X^2 \otimes w & (XY) \otimes w \\ (XY) \otimes w & B = Y^2 \otimes w \end{bmatrix} \quad (9)$$

Where  $\otimes$  is convolution operator, w is coefficient weight.

3. Corner response function  $R$  is distinct by following:

$$R(x, y) = \det(M(x, y)) - k (\text{trace}(M(x, y)))^2 \quad (10)$$

Note down  $k = 0.04$  is an experiential value,  $\text{Det}(M)$  is the determinant of matrix  $M$ , and  $\text{Trace}(M)$  is the trace of  $M$ .

4. Harris operator defines an appropriate threshold  $T$  and possible corners can be acquired by differentiating the angel response function  $R$  to threshold  $T$ . If  $R$  is more than  $T$ , the point can be hold as a possible corner.
5. Harris corners can be acquired

### Improved Susan Operator

One of the intensity based method is a Susan operator. This operator is used to obtain the possible corners. The area can be calculated as follows:

$$n(r_0) = \sum_{r \in c(r_0)} c(r_0, r) \quad (11)$$

Where  $c(r_0)$  is area which center is in  $r_0$  and the  $c(r_0, r)$

$$R(r_0) = \begin{cases} g - n(r_0)n(r_0) \leq g \\ 0 & n(r_0) > g \end{cases} \quad (12)$$

In the above equation, the geometric is represented as  $g$  and this is effect the sharpness of corner points which has been identified. In order to enhance ant-noise ability, the highest limit and smallest limit of  $g$  are fixing.

### Corner Matching

Choose the unique corner value between the comparisons of two corners by using the Normalized Correlation (NC). The centre of  $w$  is the corner points set  $p$  in image, and the centre of  $w$  is the corner points set  $r$ .  $u$  is the mean of the entire pixels' value. The normalized correlation coefficient has been estimated as follows:

$$NC = \frac{\sum_i w(x_i, y_i) - u}{\sqrt{\sum_i (w(x_i, y_i) - u)^2}} \quad (13)$$

### HHCD Algorithm Procedure

The Harris operator has strapping immovability but its accuracy is poorer. Susan corners accuracy is higher but its permanence is deprived. Therefore, the two corner detection operators are grouped together to get the good detect corners. The important subject is that: initially, extract the Harris Corners and Susan Corners from the specified image and the images wanted to register by Harris and Susan operators correspondingly. Finally, the corner points set are combined to get the entire points sets; subsequently, choose the fresh corner points sets by a series of operations and get the matching corner pairs.

1. Get the corner point's sets  $a = (a_1, a_2 \dots a_{N1})$  in specified image and  $b = (b_1, b_2 \dots b_{M1})$  in image wanted to register by Harris operator; to calculate the corner response function of the entire image pixel by using the equation (10) in specified image and image registration which create up of response function.
2. Get the corner point's sets  $c = (c_1, c_2 \dots c_{N2})$  in specified image and  $d = (d_1, d_2 \dots d_{M2})$  in image wanted to register by Susan operator; to calculate the corner response function of the entire image pixel by using the equation (12) in specified image and image registration which create up of response function.

3. Corner point sets  $A = (A_1, A_2 \dots A_N)$  in reference image can be acquired by  $A = a \cup c$ . Corner point sets  $B = (B_1, B_2 \dots B_M)$  can be acquired by  $B = b \cup d$ . After that, matrix is produced for Harris corner points and enhanced Susan corner points.
4. The normalized response function is executed for Harris and enhanced Susan corner points.
5. Get hold of the corner potency value using hybrid Harris detection method by the side of with highest correlation coefficient value.

The orientation of every edge pixel wanted to be calculated online, creating it cost to compute. There is one potential solution is to speed up the constraint without loss of any data and it is quantize the edge pixel in sub-vectors representing various orientations. Enhance sturdiness to registration fault is to misplace the positions of constraints in same calculations. It means the edges in the adjacent positions could be also unique. The appropriate comparison calculation can be rehabilitated as:

$$Sim(A, B) = 2 \cdot \frac{\sum_{i=1}^{4 \times D^2} Hit(a_i, b_i) * R(a_i, b_i)}{(N_A + N_B)} \quad (14)$$

$$Hit(a_i, b_i) = \begin{cases} 1 & \text{if } a_i \cdot b_i = 1, |l_a^{(i)} - l_b^{(i)}| \leq w \\ 0 & \text{otherwise} \end{cases} \quad (15)$$

$$R(a_i, b_i) = \begin{cases} 1 & \text{if } a_i \cdot b_i = 1, R \geq s \\ 0 & \text{otherwise} \end{cases} \quad (16)$$

In the above equation the position of an edge pixel is represented as  $l$  and a threshold controlling the severity of position limitation is represented as  $w$ . on the other hand, it has most computational cost so introduce an edge expansion method to get an enhanced edge descriptor. Spontaneously, a binary vector can be compressed by eliminating the sparse bins, which every time demonstrates 0-value [24]. Classify the compression of the  $k^{th}$  bin in the initial Edge-SIFT descriptor with Eq. (17), it means,

$$\chi_k = \sum_{i=1}^N v_k^{(i)} / N \quad (17)$$

In equation (17), the number of collected edge descriptors is represented as  $N$  from a dataset. The value of the  $k^{th}$  bin is represented as  $v_k^{(i)}$  in the  $i^{th}$  descriptor. Same kind of bins is extracted and the uniqueness among the two images is measured. Consequently, set of threshold for descriptor compression. Particularly, bins with compression underneath the threshold will be eliminated.

### C. Discriminative Bins Selection

Initially, choose the more number of primary bins with high compression from initial Edge- SIFT. After that find and insert the discriminative bins to acquire the last compacted Edge-SIFT. Among the two images  $A$  and  $B$  the similar value is calculated and it calculated corresponding to the number of matched descriptors among the two edges. Radial Basis kernel function is measured by using the following equation and it can be written as follows:

$$h(x - x_n) = \frac{v(x - x_n)}{\sum_{n=1}^N v(x - x_n)} \quad (18)$$

The above equation  $h(x - x_n)$  is known as kernel function because it used to the each sample to calculate value at  $x$ . if noise noise  $v(x)$  is isotropic, consequently, there is a only one function of  $||x||$  after the origin functions are radial functions are normalized. This method is used to choose the  $n$  number of bins.

### D. Lookup Table-Based Similarity Computation

Every compacted binary Edge-SIFT can be referred to as a list of common units. It means bytes. Every byte can be referred as an integer code with value among the range is  $[0, 255]$ . Consequently, the comparison among the two Edge-SIFT descriptors calculations is transferred as the comparison among the two lists of integer codes is calculated. Therefore, similarity computation can be written as follows:

$$FastSim(A, B) = \frac{2 \cdot \sum_{i=1}^U MEPN(C_A^{(i)}, C_B^{(i)})}{\sum_{i=1}^U TEPN(C_A^{(i)}, C_B^{(i)})} \quad (19)$$

In the above equation the number of integer codes are represented as U. it means C in Edge-SIFT. Consider 384 bit is the size of the Edge-SIFT, and then 48 would be the U. MEPN (·, ·) and TEPN (·, ·) go back the Matched Edge Pixel Number and Total Edge Pixel Number in two codes, correspondingly.

### E. Indexing and Retrieval

To produce BoWs demonstration, initially quantize Edge- SIFT into code words. Visual vocabulary tree can be produced all the way through clustering with the clear uniqueness calculations. The subspace clustering algorithm is introduced in this work for rescue the higher correspondence calculations. Subspace clustering is observed to find the subspaces of the feature space in which clusters already presented. It is effective method to the subspace clustering visual work generation trouble. Subspace clustering is the assignment of robotically identifying clusters in subspaces of the real feature space. Visual vocabulary tree produced through clustering with the correspondence calculations.

#### Subspace Clustering Algorithm

1. Subspace Clustering (Set of vocabulary, images A and B, quantization code and verification code)
2.  $S_1 = \emptyset$  // set of subspaces containing clusters
3.  $C_1 = \emptyset$  //set of all sets of clusters in subspaces
4. For each  $a_i \in A$  do
5.  $C^{(a_i)} = Clustering \{a_i\}$
6.  $S_1 = S_1 \cup \{a_i\}$
7.  $C_1 = C_1 \cup C^{(a_i)}$
8. end if
9. End for
10.  $k := 1$ ;
11. while  $C_k \neq \emptyset$
12.  $wordS_{k+1} = genertaewordsubspaces$
13. for each word  $\in wordS_{k+1}$  do
14. best subspace =  $min_{s \in S_k \wedge s \in word} \sum_{C_i \in C^s} |C_A| |C_B|$
15.  $C^{word} = \emptyset$
16. For each cluster  $cl \in C^{bestsubspace}$  do
17. If  $C^{word} \neq \emptyset$  then
18.  $S_{k+1} = S_{k+1} \cup word$
19.  $C_{k+1} = S_{k+1} \cup C^{word}$
20. end if
21. End for
22. End for
23. End while

The entire density-connected clusters in subspace S is represented as  $C^S$  with respect to  $\epsilon$  and m. the entire k-subspaces are represented as  $S_k$  and it having at least one cluster. In the k-subspaces the set of entire clusters is represented as  $C_k$  [25]. This algorithm is having the set of vocabulary, images A and B, quantization code and verification code. The subspace and this method are observed to cluster best subspace is represented as  $a_i$  by taking out the largest unique words. In the entire detected cluster, it has to validate whether this cluster is in subspace or not. For every subspace  $S \in S_k$  search the subspaces then produce the word subspaces  $wordS_{k+1}$ . for every individuality subspace word is belongs to the word  $S_{k+1}$ . it get one subspace and produce  $C^{word}$ . To reduce the price of the work, it selects the subspace using best Subspace  $\subset$  word from  $S_k$  in which a smallest amount number of objects are in the cluster.

BoW depiction is measured during quantizing local features into visual words. Consequently, quantization fault is identified and it can reduce the image rescue effectively. By partitioning Edge-SIFT subsequent to discriminative bins selection ( $\alpha$  and  $\beta$ ), this method can keep away from the quantization error. This is based on the Quantization Code (QC) and Verification Code (VC). QC is used to produce the visual vocabulary tree and Edge-SIFT quantization. It means BoWs representation calculation. VC is holding the index file for internet validation. The indexing method is based on the constant inverted file indexing structure. This method is used to enhance the most related unique outcome and decrease the not related word subspaces.

Based on the client-server structure the image of mobile retrieval is developed, while the server keep an image index and the mobile device uploads the number of queries then receives retrieval outcomes. Two types of data should be sent for query from the mobile in the present retrieval structure. It means visual word ID and VC of every Edge-SIFT. Therefore, maintenance a higher VC would possibly enhance the retrieval performance and give the low transmission price. Moreover, it decreases the number of iterations and for this reason the calculation speed is raised and time complexity is decreased. The quality image is acquired as higher and detection accuracy is enhanced rather than previous methodologies.

#### IV. EXPERIMENTAL RESULTS

The Oxford Building [26] is used for validating the effect of various parameters and estimating the weight of Edge-SIFT compact. In the oxford building database there are 5062 images are available and it is gathered from a specified location by searching flicker. By using 11 various locations the collection are gathered and it is representing 5 possible queries to generate a complete fact. In that way, it produces 55 set of queries to estimate the retrieval system. The significant level among the queries and dataset images has been physically annotated. There are 4 potential labels have been produced for the entire locations and the image in the system.

Good - A good, obvious image of the object/building.

OK - More than 25% of the thing is obviously capable to be seen.

Bad - The object is not close by.

Junk - Less than 25% of the object is visible, or there are high levels of occlusion or twist.



Figure 2: Retrieved Images



Figure 3: Retrieved Images



Figure 4: Test Image

**Parameter Selection:** The proposed Subspace clustering Edge SIFT (SC-ESIFT) and preceding improved Harris corner and Edge SIFT (HC-ESIFT), Edge-SIFT methods are associated to the three parameters namely, maintain the size of the extracted image patch is represented as  $r$  and the choose the size of the edge map is denoted as  $D$  and finally, controls of the edge expansion is denoted as  $w$ . Test the possessions of these parameters in image retrieval tasks.

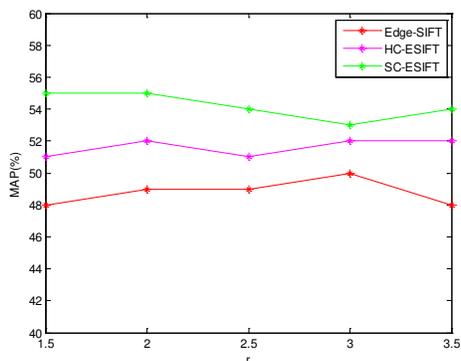


Figure 5: Illustration of the Effects of  $r$

The effect of  $r$  among the method of edge detection namely SC-ESIFT, HC-ESIFT, and Edge SIFT are demonstrated in figure 2. Focusing on this figure, it is focused that higher  $r$  is useful for performance enhancement; for this reason that the higher image patches contain the edge clues, which create edge descriptors more discriminative. On the other hand, improving the  $r$  does not consistently enhance the performance among the edge detection methods like SC-ESIFT, HC-SIFT and Edge-ESIFT. The set of parameter  $r$  as 2.5 represented from the figure 5. This demonstrated a better performance for SC-ESIFT method because the present work Hybrid Harris Corner Point Detection is also performed to improve the efficiency and also the accuracy.

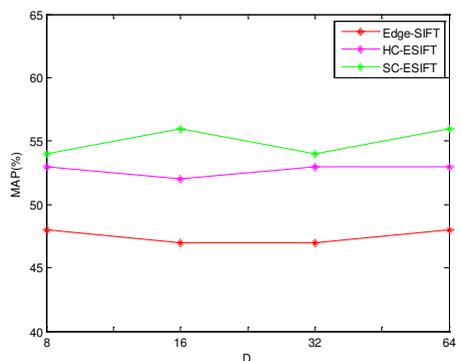


Figure 6: Illustration of the Effects of  $D$

The effect of D among the method of edge detection namely SC-ESIFT, HC-ESIFT, and Edge SIFT are demonstrated in figure 6. It is apparent in the figure that, the rescue of the performance degrades, if D is too big or too little. Spontaneously, the less value of D in compression descriptor, on the other hand it does not lose the information of the image patches, because the absolute corner points also considered for the period of edge detection process. The parameter of the D is assign as 16 from the figure 6 and it demonstrate the better performance for SC-ESIFT approach. It is used to improve the detection of the corner process and also the efficiency.

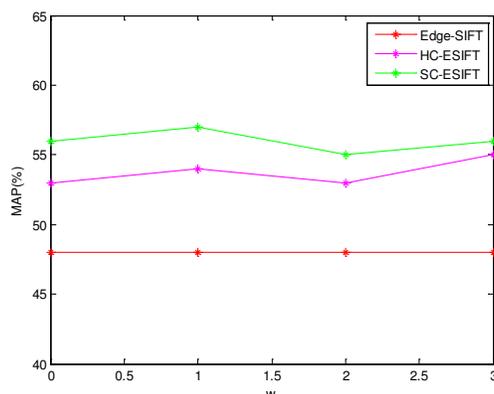


Figure 7: Illustration of the Effects of w

The effect of w among the method of edge detection namely SC-ESIFT, HC-ESIFT, and Edge SIFT are demonstrated in figure 2. Focusing on this figure, it is focused the edge expansion is useful for performance enhancement. On the other hand, consider w=3 then the nearest edges and their corner points were accurately identified in the present method, it enhance the accuracy of the model. For now, the validity of edge expansion is nearly related to the edge map size. For example, consider the initial descriptor value is  $16 \times 16 \times 4$  bit, assign the value of w as 1; at the same time as the initial descriptor value is  $32 \times 32 \times 4$  bit, assign the value of w as 2. It gives high quality image by the side of with enhanced accuracy and efficiency.

**Validity of Edge-SIFT, HC-ESIFT and SC-ESIFT Compression**

After the process of choosing the parameter, consequently compact the primary Edge-SIFT and choose the discriminative bins. Two types of primary Edge-SIFT descriptors for the test purpose: a 1024 bit in r and D, w are 2.5, 16, and 1. One more 4096 bit one whose r, D, and w are 2.5, 32, and 2, correspondingly. At first, the compact of two descriptors 32 bit and 64 bits by deciding the compression bins. By using the Rank Boost approach the compression bins are chosen in the Edge-SIFT, HC-ESIFT descriptors and by using the kernel function the SC-ESIFT compression bins are selected for absolute matching.

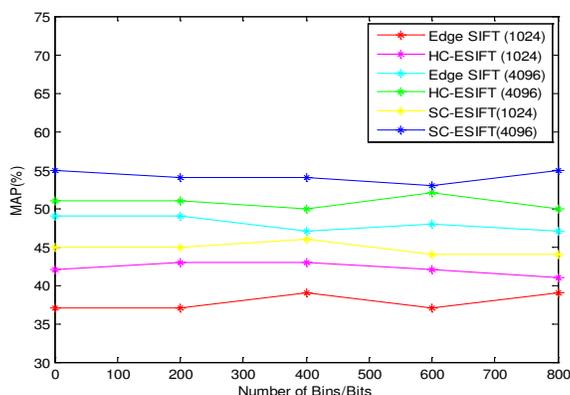


Figure 8: Illustration of the Validity of the Descriptor Compression

Figure 8 explains that more number of bins is chosen for the compact descriptors, their retrieval performance are enhanced extraordinarily. The weight of discriminative bins selection method is proved using the kernel function. The compacted SC-ESIFT method from the 4096 bit descriptor at last the one from the 1024 bit descriptor. Because, in the present work by using radial basis kernel function the accurate bins are chosen. This demonstrates that higher descriptor obtain the clues, therefore most discriminative bins can be chosen. The exact match among the two various images are identified by using the kernel function. It can be also focused that, two compacted descriptors at last their primary descriptors with highest compression size.

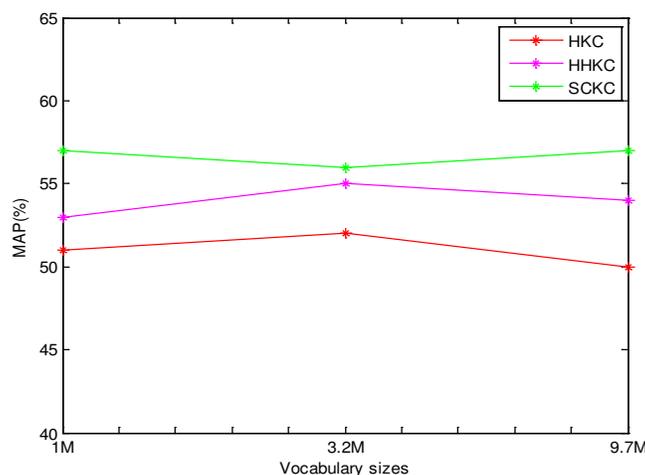


Figure 9: Comparisons of MAP and Efficiency with Different Vocabulary Sizes

By using the hierarchical clustering process create the visual vocabularies and the descriptors which divide the tree into 5 stage of vocabulary tree by using the hybrid hierarchical clustering approach. Assign the branch numbers as 16, 20, and 25, equivalent to three vocabulary sizes: 1M, 3.2M and 9.7 M, correspondingly. Differentiation between the 1024 bit SIFT descriptor are demonstrated in Figure 9. After the differentiation process among the Hierarchical k centre means (HKC) and Hybrid Hierarchical K-Centres (HHKC). It demonstrates that the present Sub Space Hierarchical k Centre (SSKC) generates a high map to three vocabulary sizes. The present SSKC is used to calculate the database image and the correspondence queries with hierarchical clustering algorithms for every cluster.

## V. CONCLUSION AND FUTURE WORK

In this work, the HHCD algorithm is proposed to enhance the result and also the efficiency of the real image. HHCD with SC and edge based local descriptor is known as SC-ESIFT. The present HHCD is different from the traditional SIFT descriptor because it considers and updates four key modules, as well as feature extraction, image matching/retrieval, feature quantization and image denoising. To eliminate the noise by raising the fitness value of intensity, by using the PSO algorithm with HHCD in image deblurring process. To validate the noise level, after acquiring the deblurred image by using the PSNR value. It gives the higher rate of PSNR and therefore a good quality of the image can be produced. In feature extraction process, the improved HC-SIFT method is to create the edge maps of local image patch and hold the positions of both images and also the orientation of edges. After the process of decomposing the edge map into the various sub-edge maps corresponding to the directions of edges. So to create the Edge-SIFT, further strong and extra compressed, supplementary learn HHCD and discriminative bins assortment using RB kernel function. The HHCD method is developed based on coefficient correlation function. In this work, the modification of the signal with parch movement is calculated in various directions. Visual vocabulary tree can be produced all the way through SC with the distinct correspondence dimension in the feature quantization process. The indexing methodology is based on the inverted file indexing structure. On the other hand, every index list having the additional validation code for internet verification. Therefore, the SC-ESIFT is compressed, discriminative and efficient. And also the rescue system is absolute and resourceful for large scale mobile partial-duplicate image re-possession. Finally, the process on the mobile devices needed a numerous of manufacturing

implementation and optimization. Accordingly, the common PC reproduced the mobile proposal to differentiate the SC-ESIFT, HC-ESIFT with Edge-SIFT in the reason of retrieval accuracy, efficiency, and data transmission. To decrease the time complexity and raise the absolute real image by using this present methodology it can be achieved. It does not modify the presence of image patches and enlarge the corner point detection in mobile visual search. On the other hand, the Edge-SIFT detector PSO edge detection parameters are set and it reduce the performance of incomplete mobile search results.

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## An Efficient Segmentation of Blood Vessels and Optical Disc in Retinal Images Using Firefly Optimized ANFIS

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### Abstract---

Retinal image analysis is becoming increasingly famous in the form of a noninvasive diagnosis technique in modern ophthalmology. Automated analysis of retinal images is a process with challenges, whose aim is to offer automated techniques for helping in the primitive detection and diagnosis of several eye diseases like diabetic retinopathy and age-related macular degeneration (AMD). In order to diagnose these diseases, much significance has been given to the segmentation of the blood vessels. Earlier, the Markov Random field, neural networks, Adaptive Neuro Fuzzy Inference System (ANFIS) and Genetic optimization based ANFIS (GANFIS) have been evolved. But it has not rendered a satisfying result. For the purpose of solving this issue, the new system proposed a Firefly optimization based ANFIS with creditable regard to Mahalanobis Distance (F-ANFIS-MD). Hybrid Time Domain Constraint Estimator & Adaptive Histogram Equalization (HTDCE-AHE) is utilized for image denoising and image enhancement. The segmentation of an optic disc is done by making use of Adaptive Markov Random fields (MRF). Thereafter the choice of the features extracted is carried out for retinal vessel segmentation through Modified Particle Swarm Optimization (MPSO) using the Harmonic search algorithm. For conducting the vessel detection, Firefly optimized ANFIS is employed. Finally, the extraction of the GLCM features is done for analysing the eye diseases such as Cataracts, Glaucoma, Ocular Motor Nerve Palsies and Rubeosis Iridis. At last, the results from the performance evaluation confirm the performance of the vessel detection of the novel F-ANFIS-MD approach.

**Keywords---** Retinal Image, MRF, Firefly Algorithm, Vessel Segmentation and Optical Disc Segmentation.

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## I. INTRODUCTION

Retinal image analysis is getting highly well-known to be a noninvasive diagnosis technique in modern ophthalmology [1]. The morphology of the retinal blood vessel and the optic disk is a significant structural indicator for the assessment of the existence and criticality of retinal diseases like diabetic retinopathy, hypertension, glaucoma, hemorrhages, vein occlusion, and neovascularization. Blood vessels in the retina form part of the retina, which serves in supplying blood and oxygen to the blood vessels of the retina [2] [3]. In case the blood and oxygen supplies are not going smooth, then this might indicate if there are any health problems (hypertension, cardiovascular, stroke or diabetes). In order to detect these defective veins, the segmentation of blood vessels in the retinal digital images is carried out. There exists several approaches developed to deal with the segmentation of blood vessels (supervised and un-supervised), but still do not satisfy the condition of standards [4]: (1) Branching blood vessels, (2) Merging of adjacent blood vessels, (3) Loss of blood vessels are thin / small and (4) Error detection of blood vessels in the particular area.

The optic disc (OD) is treated to be one among the important features of a retinal fundus image. It is the location where the blood vessels and optic nerves enter the retina of human eyes. The OD is considered to be the brightest portion of the normal fundus images. Detecting the optic disc (OD) is regarded to be one among the important part of evaluation of digital color retinal images [5]. The location of the optical disc is regarded to be the landmark for analyzing and identifying the eye disease and blood vessels in retinal images.

Youssif et.al proposed an optic disc detection, which is carried out by making use of matched filter. The segmentation of the retinal vessels is done by employing a simple and standard 2-D Gaussian matched filter. As a result, a vessels direction map of the segmented retinal vessels is got by utilizing the same segmentation algorithm.

Then the segmented vessels are thinned, and filtered exploiting local intensity, in order to finally indicate the OD-center candidates.

For having an accurate segmentation, multi-scale line detection technique is employed. It is an efficient technique for the automatic extraction of blood vessels from color retinal images. The method is designed on the basis of the fact that by varying the length of a fundamental line detector, line detectors at differing scales are accomplished. In order to keep up the strength and avoid the setbacks of every individual line detector, the line responses at changing scales are combined linearly in order to yield the final segmentation for every retinal image [6].

For achieving automatic segmentation, 2-D Gabor wavelet and supervised classification is brought into use. The technique generates segmentations by the classification of every image pixel to be vessel or non vessel, depending on the feature vector of the pixel. Feature vectors consist of the intensity of the pixel along with the two-dimensional Gabor wavelet transform responses obtained at various scales. The Gabor wavelet has the capability of tuning to particular frequencies, thereby permitting for noise filtering and vessel enhancement in one single step.

The system makes use of a Bayesian classifier having class-conditional probability density functions (likelihoods) defined as Gaussian mixtures, rendering a rapid classification, when being capable of modeling complicated decision surfaces [7].

## II. RELATED WORKS

Mueen et al devised an algorithm comprising of the potential pre-processing methods (contrast enhancement) and automated thresholding for performing the automated segmentation of blood vessels. Usually, the contrast seen among the blood vessels and the retinal tissues are seen to be fuzzy in the fundus images.

Contrast-Limited Adaptive Histogram Equalization (CLAHE) was realized for contrast enhancement by restricting the maximum slope in the transformation function. Moreover, ISOData method was utilized for automated thresholding [8].

Soares et.al introduced a technique for the detection of blood vessels. The primary step comprises of the application of anisotropic diffusion filtering in the initial vessel network. In the second subsequent step, a multi-scale line-tracking procedure permits the detection of all vessels with same kind of dimensions at a selected scale [9].

Computation of the individual image maps needs various steps. At first, some number of points gets pre-selected making use of the Eigen values of the Hessian matrix. Then these points are supposed to be close to a vessel axis.

Thereafter, for every pre-selected point, the computation of the response map is done from the gradient information of the image at the present scale. At last, the multi-scale image map is obtained after merging the individual image maps at varying scales (sizes). Two openly available datasets have been utilized for testing the performance of the advised technique.

Chaudhuri et al. [10] proposed a framework for the segmentation of the blood vessels in the retina. The technique is dependent on the optical and spatial characteristics of the vessels, in which the approximation of the gray-level profile of the cross section of a blood vessel is done by a Gaussian shaped curve and a matched filter is utilized in order to describe the piecewise linear segments of the blood vessels. At last, twelve various templates are developed in order to look out for vessel segments along every probable direction.

Kawata et al [11] performed the analysis of the blood vessel structures and detection of the blood vessel diseases, with the help of cone beam CT images. X-ray digital angiograms are gathered employing rotational angiography. 3D image reconstruction is conducted by means of a short scan cone-beam filtered back projection algorithm on the basis of the shorter injection time of the contrast medium. At first, a graph description process does the extraction of the curvilinear centerline structures of the vessel tree making use of thresholding, removal of the small connected components, and 3D fusion procedures. Thereafter, a 3D surface representation process does the extraction of the features of convex and concave shapes on blood vessel surface.

The algorithm is executed over a set consisting of patient images having abdominal blood vessels, with two aneurysms and one stenosis, and then the results are revealed.

Morphology indicates the study about object forms or shapes. Ana et al demonstrated an automated approach for segmenting the blood vessels in retinal images by taking the morphological properties into consideration.

This system makes use of the intensity and morphological characteristics of vascular structures, like linearity, connectivity, and width [12]. Fraz et.al proposed a morphological processing that assists in the detection of the vessels.

This system defines two techniques for the identification of general vascular segments that are associated with two diverse mechanisms for the classification of every pixel to be belonging to vessel or not and then these approaches were utilized for vasculature segmentation application also. The techniques used are pixel processing based and tracking approach.

The pixel processing based technique employs two step approaches. In the first step, the process enhancement is carried out, and the chief aim of this process is the selection of an initial set of pixels that has to be validated to be vessels in the next second step.

The subsequent approach is the beginning of tracking by finding the vessel points utilized for the tracing of the vasculature, by the measurement of few image characteristics [13].

### **III. PROPOSED METHODOLOGY**

In this technical work, with the goal of enhancing the classification concerned with the retinal blood vessels, so as to make it more efficient, a Firefly optimization based Adaptive Neuro Fuzzy Inference System is designed with respect to Mahalanobis Distance (F-ANFIS-MD). First, this strategy uses a hybrid model of Time Domain Constraint Estimator & Adaptive histogram equalization for the purpose of image denoising and enhancement of image.

Then the Optical Disc (OD) segmentation is carried out utilizing Adaptive Markov Random fields. Thereafter the features selection is carried out for retinal vessel segmentation by means of Modified Particle Swarm Optimization (MPSO) using Harmony Search (HS) algorithm. Finally, the detection of vessel is performed using the novel F-ANFIS with MD. After this, the extraction of the GLCM feature is conducted for the purpose of analyzing the eye diseases. The overall processing of the newly introduced system is shown in Fig 1.

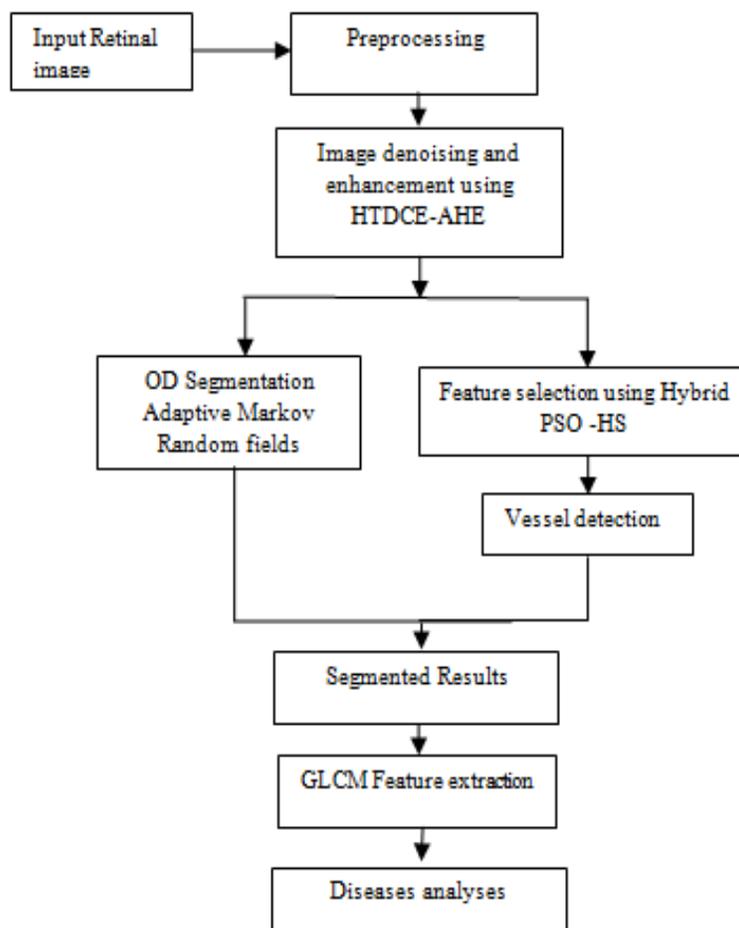


Figure 1: Overall Process

**Image Denoising and Enhancement using HTDCE-AHE**

Image denoising has an important role to play in digital image processing. There are several schemes for the removal of noise from images. Any good denoising strategy should be capable of retrieving as much possible image details though the image is hugely impacted by noise. In this new system, Time Domain Constraint Estimator (TDCE) is utilized for the denoising of fundus images. The technique maintains the contrast of the images in addition to the image details while also eliminating the noise.

Let  $\hat{s} = Hx \in R^m$  refer to the linear estimator of the pure signal vector  $s$  where  $H \in R^{m \times m}$ .  $H$  is got through the minimization of the residual signal  $r = \hat{s} - s \in R^m$ . This is expressed by Equation 1.

$$r = Hx - s = H(s+n) - s = (Hs - s) + Hn = r_s + r_N \tag{1}$$

where the signal distortion is referred to by  $r_s$ , and the noise residual is indicated by  $r_N$ . Both the signal distortion and residual noise cannot be reduced simultaneously. TDCE is introduced to deal with signal distortion and noise reduction. TDCE helps in maintaining the signal distortion by reducing the residual noise since the residual noise energy with regard to Equation 2 is,

$$\epsilon_N^2 = \|r_N\|_2^2 = \text{tr}\{r_N r_N^T\} = \text{tr}\{H((nn^T))H^T\} = \text{tr}\{HR_n H^T\} \tag{2}$$

The energy of the residual noise is seen with a threshold corresponding to Equation 3.

$$\epsilon_N^2 \leq mv^2 \text{ where } v^2 \text{ refers to a positive constant} \tag{3}$$

Equation 4 is employed for minimizing the energy of the signal distortion.

$$\epsilon_s^2 = \|e_s\|_2^2 = \text{tr}\{e_s e_s^T\} = \text{tr}(H - I_m)R_s(H - I_m)^T \tag{4}$$

By merging Eq.3 and Eq.4, the time domain constraint estimation is got,

$$\min_H \varepsilon_N^2 \text{ subject to } \varepsilon_N^2 \leq mv^2$$

The amount of noise is reduced by decreasing the threshold level  $v^2$ . By utilizing Tuhn-Tucker conditions to reduce the constraints, optimal distortion can be got. In case it meets the gradient equation of the Lagrangian, then H can be considered to be a feasible point, which is stationary. In a similar manner, making use of a data matrix, which has n realizations and  $X \in R^{m \times n}$ , then  $\hat{s} = XW \in R^{m \times n}$  where  $H \in R^{n \times n}$  using Eq.6, the residual matrix, E, is got.

$$E = \hat{s} - s = XH - s = s(H - I_n) + NH = E_s + E_N \tag{5}$$

where,  $E_s$  and  $E_N$  refer to the respective signal distortion and the residual noise matrix. The Lagrangian formulation is expressed in Eq.6.

$$L(H, \mu) = \varepsilon_s^2 + \mu(\varepsilon_N^2 - mv^2) \tag{6}$$

Where,  $L(H, \mu)$  is the Lagrangian multiplier. With, an optimum H is got (denoised signal), as in Eq.7.

$$H_{TDCE} = R_s(R_s + \mu R_n)^{-1} \tag{7}$$

It was observed that the Time Domain Constraint Estimator (TDCE) revealed a higher performance in the PSNR enhancement of retinal fundus image.

Image enhancement is a procedure of removing the unnecessary distortion owing to degradation in contrast, unnecessary noise, incorrect intensity saturation, blurring effect etc, and then decides about the information hidden in images. Adaptive Histogram Equalization (AHE) is mostly used in image processing methodologies and it's useful in increasing the contrast present within the images. In the adaptive algorithms, every pixel is changed on the basis of the pixels, which are present in a region enclosing that pixel. This region is known as contextual region. The adaptive histogram equalizations are computation wise intense and for this cause, few techniques were developed in order to raise the speed of the original technique. In case the system contains an image of  $n \times n$  pixels, along with k intensity levels and the size of contextual region is referred to by  $m \times m$ , then the time necessary for computations is  $O(n^2(m+k))$ . Better results are got if the system uses just four closest grid points rather than the histogram of neighborhood pixels from a mobile window. The change in every pixel is carried out by the interpolation of the mappings of the four closest points. It has been utilized for improving the contrast images and it is appropriate for the improvement of the local contrast with more detail along with over amplified noise. Fig 2 shows the results of analyzed images after denoising and enhancement.

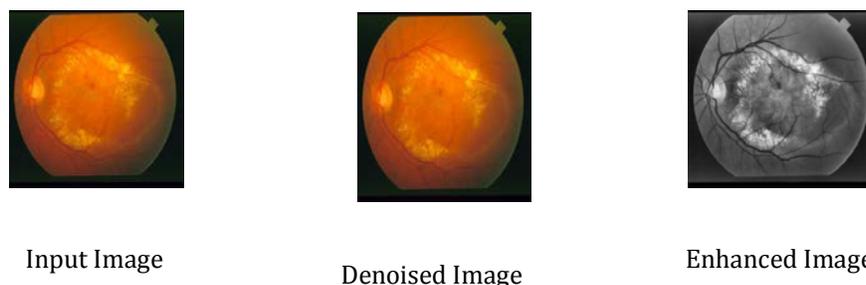


Figure 2: Retinal Images After pre-Processing

### **OD segmentation using Adaptive Markov Random fields**

The newly introduced system presented an Adaptive Markov Random fields for the process of OD segmentation. MRF has since been identified to be an accurate model for representing the local statistical dependence of the image. It yields an easy and consistent means for the modeling of the spatial-contextual information that is integrated in the neighborhood of every pixel. The change detection issue under the MRF framework can be regarded to be a job of energy minimization. The energy function is provided by:

$$E(X_R) = E_{data}(Y_{mn}, X_{m,n}) + \lambda E_{sm}(Y_{mn}) \tag{8}$$

Where  $E_{data}(Y_{mn}, X_{m,n})$  refers to the individual unary energy term, and  $E_{sm}(Y_{mn})$  defines the inter-pixels class dependence.  $\lambda$  indicates the smooth weight,  $E_{sm}(Y_{mn})$ , which is formulated in the following relationship

$$E_{sm}(Y_{mn}) = \sum_{\{(g,h),(m,n)\} \in Y} \delta_k(Y(m,n), Y(g,h)) \quad (9)$$

Where  $\{(g, h), (m, n)\} \in N$  indicates the clique types present in the neighborhood.  $\delta_k(\cdot)$  stands for an indicator function. Hence, the problem of change detection can therefore be resolved by getting the least energy configuration of the MRF. Generally, pixels that are located along the borders have more possibility to possess diverse labels and they have less influence from its neighboring pixels. On the contrary, the pixels, which are located far from the edges generally belong to the same cluster and contain a tight correlation among them. In order to model the spatial-contextual information that is included in the neighborhood of every pixel with more sense, an adaptive MRFs having a changeable order of neighborhood  $N$  and variable smooth weight  $\lambda$  is adopted. For the pixels that are positioned in the region tagged with index  $C$ , a small  $\lambda$  and the first-order neighborhood  $N1$  is adopted; for the pixels in the region that is marked with index  $HC$ , a huge  $\lambda$  and a second-order neighborhood  $N2$  are chosen; and the pixels located in region that are marked with index  $N$  are provided the label with no change directly with no further detection. In this manner, the adaptive MRF provides a more accurate model for representing the local statistical dependence of image. A last change map is got by reducing the energy function. Fig 3 shows the results of OD segmentation process.

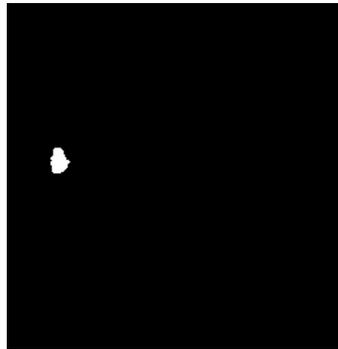


Figure 3: OD Segmented Image

### ***Pixel based Feature Selection for Retinal Vessel Segmentation using MPSO with Harmonic Search Algorithm***

Particle swarm optimization (PSO) is basically a metaheuristic algorithm motivated by the social behavior of populations along with collaborative characteristics. The PSO mimics this collaboration of species and is extensively utilized in resolving mathematical optimization problems. PSO shows easier understanding, simpler operation, and fast searching. It has been applied with success in many fields. It is transformed to create a Modified PSO (MPSO) by making harmony search algorithm for having a rapid performance.

HSA is based on the concept of the behavior of the musician in the search for better harmonies. It attempts in finding the optimal solution based on an objective function. The harmony is associated with the optimization solution vector; the musicians are associated with decision variables, and the musical instrument's pitch range bears analogy to the value range of the decision variable. Harmony at a particular time having analogy with the solution vector at particular iteration and agreements of the audience is associated with the objective function. When every variable chooses one value in the HSA, it will adopt one among the three rules:

1. Choosing a random value from the permitted range.
2. Choosing a value from the harmony memory.
3. Choosing an adjacent value of one among the values in the harmony memory.

These rules are identical to the musician's behavior, exploited for producing a piece of music having a perfect harmony: Composing new or random notes

1. Playing any well-known tune with precision from his or her memory.
2. Playing something identical to the tune mentioned above.

First, the modified PSOHS makes use of HS for searching, and thereafter it makes use of the position of the PSO update mode for accelerating the particles to the optimal solution convergence. Simultaneously, the random elimination scheme of CS can escape local optima with success, thereby enhancing the performance of searching for the optimal solution.

In PSO algorithm, the velocity of the particle is updated by employing

$$v_{id}(k+1) = \omega v_{id}(k) + \eta_1 r_1 (P_{id} - x_{id}(k)) + \eta_2 r_2 (P_{gd} - x_{id}(k)) \quad (10)$$

Where  $v_{id}(k+1)$  refers to the  $d$ th component of particle's velocity after the  $k+1$  th update is finished.  $p_{id}$  is presently the particle's best solution of  $d$ th component just after the  $k$ th update is completed;  $p_{gd}$  is presently the population's best global solution of the  $d$ th component once after the  $k$ th update is completed;  $\eta_1$  and  $\eta_2$  refer to the positive constant parameters known as acceleration coefficients, regulating the movement steps of particles;  $\omega$  refers to the inertia weight, which controls the impact of earlier values of the particle's velocity on next subsequent one.  $r_1$  and  $r_2$  refer to random variables with a range [0, 1].

Particle position is updated by making use of

$$x_{id}(k+1) = v_{id}(k) + v_{id}(k+1) \quad (11)$$

Where  $x_{id}(k+1)$  refer to the  $d$ th component of particle's position after the  $(k+1)$ th update is completed and  $v_{id}(k+1)$  stands for the  $d$ th component of the particle's velocity after the  $(k+1)$ th update is finished.

The HS algorithm was earlier designed by Geem et al. in 2001[1], and is dependent on the natural musical performance processes which occur when a musician looks out for a better state of harmony, like that during the jazz improvisation. Jazz improvisation attempts in finding musically appealing harmony (a perfect state) as decided by an aesthetic standard, just like the optimization process tries finding a global solution (a perfect state) decided by an objective function. The pitch of every musical instrument decides the aesthetic quality, just like the objective function value is decided by the set of values allocated to every design variable.

HS algorithm optimization process, referred below, comprises of five steps.

**Step 1: Parameters Initialization** The optimization problem, specified as below: Minimize  $f(x)$  subject to

$$X_j = 1, 2, \dots, N, (1) \in x_j \quad (12)$$

where  $f(x)$  refers to an objective function;  $x$  stands for the set of every decision variable  $x_j$ ;  $N$  refers to the number of decision variables,  $X_j$  stands for the set of the possible range of values for every decision variable, that is  $x_j^{\min}$  and  $x_j^{\max}$  refer to the respective lower and upper boundaries of the  $j^{\text{th}}$  decision parameter. HS algorithm parameters are also indicated in this step, which are, the harmony memory size (HMS), or the number of solution vectors present in the harmony memory, harmony memory considering rate (HMCR), pitch adjusting rate (PAR), bandwidth distance (BW), and the number of improvisations (NI), or termination criterion, and the harmony memory (HM) where every solution vector is stored.

**Step 2: Harmony Memory Initialization and Evaluation:** A random initial population gets generated, which is:

$$x_{i,j}^0 = x_j^{\min} + r_j (x_j^{\max} - x_j^{\min}) \quad (13)$$

where  $r_j \in [0,1]$  refers to a uniformly distributed random number that is newly generated for every value of  $j$ .

Theoretically, the pitch can be adjusted either linearly or nonlinearly, but practically, linear adjustment is used. Therefore,

$$x_{new} = x_{old} + b_{range} * \epsilon V \quad (14)$$

where  $x_{old}$  refers to the already available pitch or solution from the harmony memory, and  $x_{new}$  stands for the new pitch just after the action of pitch adjusting. This typically generates a new solution around the already available quality solution by changing the pitch by a small random amount slightly [1,2]. Here  $\epsilon$  refers to a random number generator seen in the range of [-1, 1]. Pitch adjustment is identical to the mutation operator in genetic algorithms. Solution vectors in HM are evaluated, and then their objective function values are computed.

**Step 3: Improvisation** In this step, a New Harmony vector is produced on the basis of three rules, such as, memory consideration, pitch adjustment and random selection. The value of a design variable could be

chosen from the values that are stored in HM having a probability HMCR. It can be adjusted further by moving to a neighbor value of a chosen value from the HM along with a probability of pitch adjusting rate (PAR), or, it can be chosen in random from the set consisting of all candidate values without taking the stored values in HM into consideration, with the probability of (1 - HMCR).

**Step 4:** Harmony Memory Update In case the New Harmony vector is better compared to the worst vector, depending on the objective value and/or constraint violation, then the worst one will be replaced by the new vector.

**Step 5:** Termination criterion check HS algorithm is stopped if the termination criterion (e.g. maximum number of improvisations) has been satisfied. Else, steps 3 and 4 are repeated.

### Hybrid Algorithm

Step 1: The parameter is set, and then the initialization of the population is done. Population is initialized in random that are inclusive of initialization position  $p$  and velocity  $V$  of individual.

Step 2: The initial fitness value of the population is computed making use of the objective function, and the fitness value and position of the global optimal individual are decided.

Step 3: Harmony search mode gets initiated. The new solution is then updated by applying equation (14)

The fitness values of the new and old individuals are then compared; the result that is better gets chosen to a new-generation individual. The objective function (accuracy) is computed. The significant retinal features are modeled.

Step 4: PSO search mode is initialized. The position and velocity of the individual are updated, and thereafter a new individual is generated. The position is updated by making use of formula (11), and the velocity is updated by employing the formula (10). Prior to updating the velocity, the inertia weight coefficient requires to be updated by applying

$$\omega = \omega_{max} - (\omega_{max} - \omega_{min}) * \frac{iter}{run} \quad (15)$$

Where iter and run refer to the current iteration times and maximum iteration times of the algorithm, correspondingly

$\omega_{max}$  and  $\omega_{min}$  refer to the maximum and minimum inertia weights, correspondingly. When comparing the fitness values of new and old individuals, the one having the better result is chosen as a new individual, and the global optimal individual gets updated.

Step 5: An n-dimensional vector  $R_n = [r_1, r_2, \dots, r_n]$  is generated, and  $r_1$  follows a uniform distribution with [0, 1]. When  $r_i > P_a$ , a new individual is generated randomly. When the fitness values of the old and new nests are compared, the better one will be chosen to be a new generation of individuals in the population:

$$Temp_i = Lb + (Ub - Lb) * rand(1, d) * Rf \quad (16)$$

Step 6: The global and individual optimal values are updated for the images given. The optimal positions of every individuals and entire populations are updated.

Step 7: When the termination condition of the algorithm is satisfied, then the optimal position of the nest is generated as the output, and the algorithm is stopped; else, Step 3 is carried out.

Fig 4 shows the selection of features in the retinal image.

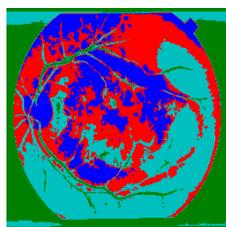


Figure 4: After Feature Selection

### Vessel Detection Using Firefly Optimized ANFIS

#### Firefly Algorithm

At first, Xin-She Yang (2007 and 2008) designed the Firefly Algorithm (FA), based on the flashing behaviors of fireflies explained by Yang (2008).

In short, FA makes use of the below three idealized rules:

1. Fireflies are unisex such that one firefly will get attracted to other fireflies with no regard to their sex.
2. The attractiveness is proportional to the brightness, and they both reduce with the increase in their distances. Therefore in the case of any two flashing fireflies, the one that is less bright will make a move towards the brighter one. In case, there exists no brighter one compared to a certain firefly, it will move in random.
3. The brightness of a firefly is decided by the landscape of the objective function. Since the attractiveness of firefly is proportional to the light intensity as observed by the neighborhood fireflies, now the variation of attractiveness  $\beta$  with the distance  $d$  is defined by

$$\beta = \beta_0 e^{-\gamma d^2} \tag{17}$$

where  $\beta_0$  refers to the attractiveness at  $d = 0$ . The movement of a firefly  $x$  that is attracted to another more attractive (brighter) firefly  $y$  is decided by,

$$a_x^{t+1} = a_x^t + \beta_0 e^{-\gamma d_{x,y}^2} (a_y^t - a_x^t) + \alpha_t \epsilon_x^t \tag{18}$$

where the second term is because of the attraction. The third term refers to randomization with  $\alpha_t$  acting as the randomization parameter, and it is a vector consisting of random numbers obtained from a Gaussian distribution or uniform distribution at time  $t$  if  $\beta_0 = 0$ , it is a simple random walk alternately, if  $\gamma = 0$ , it decreases to a variant of particle swarm optimization.

#### Architecture of ANFIS

A fuzzy model is typically a knowledge-based system featured by a set of rules. These rules carry out the modeling of the relationship between input and output. They are saved in a fuzzy rule base and described by their antecedent and consequents. In order to have the explanations simplified, the fuzzy inference system that is considered is supposed to consist of  $n=2$  inputs ( $x_1$  and  $x_2$ ) and one output ( $z$ ).  $M_i$  represents the terms number of input linguistic variables. Every input contains three linguistic variables,  $M_1 = M_2 = 3$ . The ANFIS's architecture [9, 10, 17] having two inputs and one output as indicated in Fig. 5.

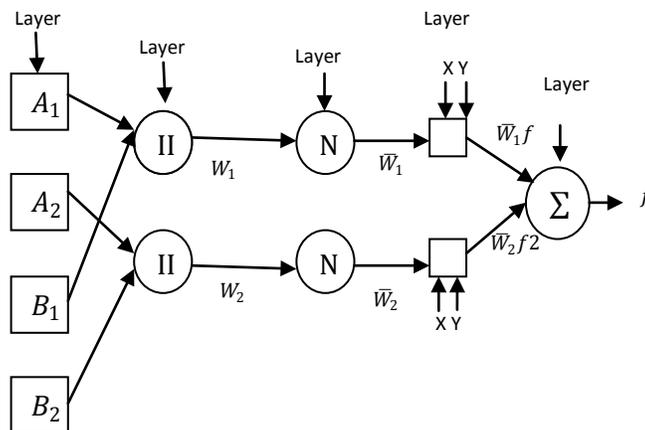


Figure 5: Equivalent ANFIS Architecture

In the design step, the system is seen extended from the 2-input system towards the 4-input system. Hence, the structure of ANFIS comprises of four inputs and one output that indicates that the forecasting system is utilized for predicting the 5th closed price value, depending on the earlier four closed price value every time. The first step in the application of FA for training the ANFIS's parameters is to describe the solution space or range of variables that has to be optimized, a set of constraints (if it is present) along the

fitness function. In this technical work, accuracy is utilized in the form of the fitness function for evaluating the quality of ANFIS. The second step is the solution encoding; every ANFIS  $i$  is denoted by a firefly. The set of fireflies stand for a population. Every firefly consists of two parts: a set of antecedent parameters and set of consequent parameters. Four input variables can be expressed in the form of the following data vector  $(x_t, x_{t-1}, x_{t-2}, x_{t-3})$ . The output is referred as  $x_{t+1}$ . Let it be assumed that an input variable is indicated by three fuzzy sets (three Gaussian membership functions). The rules are generated as

$$R_s: IF x_1 \text{ is } F_1^i(\sigma_{1i}, c_{1i}) \text{ and } x_2 \text{ is } F_2^j(\sigma_{2j}, c_{2j}) \quad (19)$$

$$\text{and } x_3 \text{ is } F_3^l(\sigma_{3l}, c_{3l}) \text{ and } x_4 \text{ is } F_4^h(\sigma_{4m}, c_{4m})$$

$$\text{THEN } y_s = p_s x_1 + q_s x_2 + k_s x_3 + t_s x_4 + r_s$$

The parameters that are required to adjust ANFIS, are coded into the individual real number code chain

### Training Step of FA

Step 1: Initialization of the population of fireflies. Based on the scale of firefly population, a set of fireflies will be generated in random. Every firefly is mapped onto ANFIS's parameter set.

Step 2: Compute the fitness value accuracy of every firefly. The light intensity of every firefly is computed by making use of the fitness function:

Step 3: Based on the light intensity, attractiveness between fireflies is compared, and the fireflies having less brightness is moved to brighter one.

Step 4: Return to step 2 till the system fitness satisfies either the fitness threshold or if the iterative number is greater the maximum permissible iterative number, terminate the process. The position and the fitness value of the best firefly becomes the output.

Once the fitness value of the chosen features of the speech signal employing Firefly algorithm is found, an ANFIS classifier, which performs an assessment depending on the best fitness values of the features selected of their distance measure, the speech signal gets classified. In the classification of the speech signal, the feature vector is provided as an input to the classifier. As the pure speech signal is computation wise very demanding to be used directly, the necessary information is chosen from the speech signal. Fig 6 shows the detection of blood vessels.

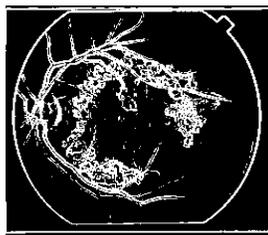


Figure 6: Vessel Segmentation

### GLCM Feature Extraction based Detection

Gray Level Co-Occurrence Matrix (GLCM) has emerged to be a well-known statistical technique for the extraction of textural feature from images. A GLCM is a matrix in which the number of rows and columns is equivalent to the number of gray levels,  $G$ , present in the image. Therefore, the usage of statistical features is one among the primitive techniques that are introduced in the image processing literature. Haralick [14] demonstrated the usage of co-1 occurrence matrix or gray level co-occurrence matrix. It takes the association between two neighboring pixels into consideration, the first pixel is called as a reference and the second is referred to as a neighbor pixel.

The textural features like Angular Second Moment, Contrast, Inverse Difference Moment, Entropy, Correlation, Cluster Shade, Cluster Prominence, Haralick Correlation get extracted in the newly introduced system for every visible band (R, G, B). Depending on the features, the diagnosis of diseases like Cataracts, Glaucoma, Ocular Motor Nerve Palsies and Rubeosis Iridis are done. A sample image containing Glaucoma is

given as input and the processing system displays the result shown in fig 7.

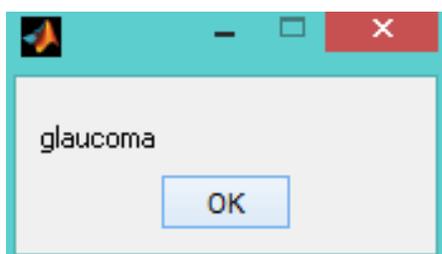


Figure 7: Disease Detection

#### IV. PERFORMANCE EVALUATION

For performing the performance evaluation of this technical work, in the vessel segmentation technique, openly available datasets, DRIVE having a total of 40 images is used. Thereafter the optic disk and vessel segmentation algorithm was tested on DRIVE, comprising of a total number of 60 images. The performances of this technique are then tested against various alternate approaches.

For facilitating the performance comparison between the Firefly optimized ANFIS with MD, GANFIS+MD Adaptive Neuro Fuzzy Inference System (ANFIS) with MD, Neural Network (NN) with the Contrast Limited Adaptive Histogram Equalization (NN+CLAHE) and MRF retinal blood vessels segmentation techniques, parameters like accuracy, sensitivity, specificity and f-measure are obtained for measuring the performance of the segmentation.

**Accuracy (ACC):** Accuracy is the ratio with regard to the correctly performed classification or the tracking made of normal and abnormal scenes in traffic monitoring process

$$ACC = \frac{(TP + TN)}{(TP + FN + FP + TN)} * 100 \quad (20)$$

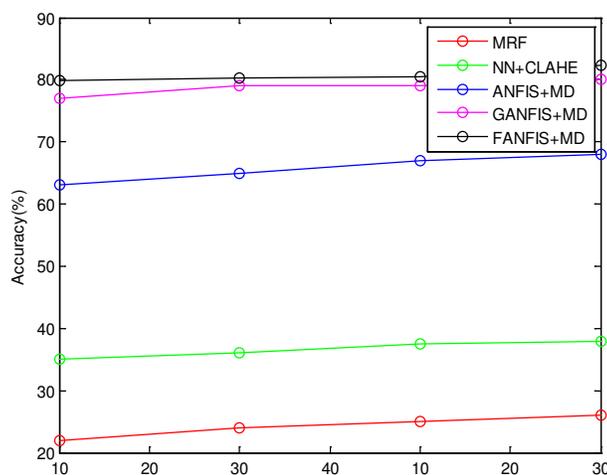


Figure 8: Accuracy

Fig 8 shows the accuracy metric comparison done between the existing and the new methodologies. The methodologies are inclusive of MRF, NN with CLAHE, and ANFIS with MD, GANFIS + MD and FANFIS + MD. It can be noticed from this graph that the newly introduced FANFIS+MD provides a much greater accuracy value in comparison with the other available systems.

**Precision:** Precision indicates the correctness of the classification or the tracking performed in the traffic monitoring video files.

$$\text{Precision} = \frac{\text{TN}}{(\text{TP} + \text{FP})} * 100 \quad (21)$$

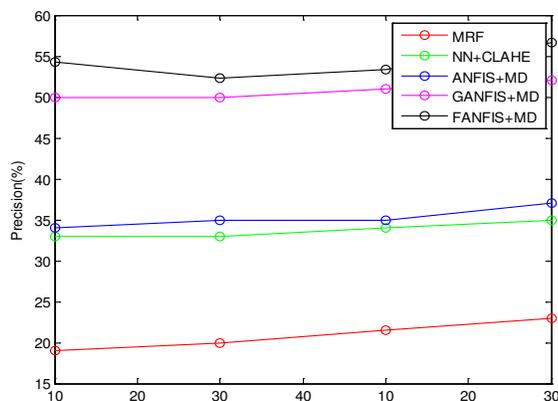


Figure 9: Precision

Fig 9 shows the precision metric comparison made between the already existing and new methods. The methods are inclusive of MRF, NN with CLAHE, ANFIS with MD, GANFIS+MD and FANFIS+MD. It can be noticed from this graph that the newly introduced FANFIS+MD yields a higher precision value in comparison with the other available system.

**Recall:** Recall is defined as the completeness of the classification or tracking performed in the traffic monitoring video files.

$$\text{Recall} = \frac{\text{TN}}{(\text{TP} + \text{FN})} * 100 \quad (22)$$

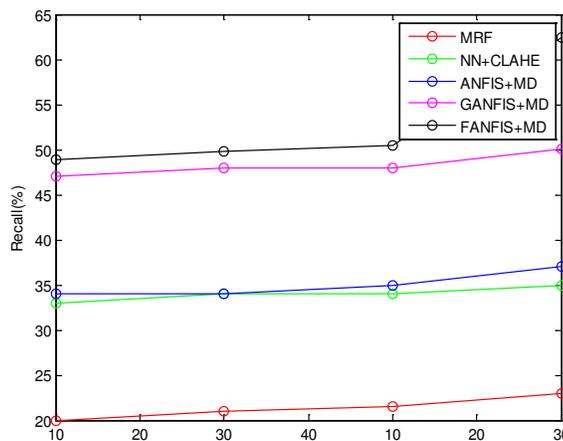


Figure 10: Recall

Fig 10 shows the recall metric comparison made between the already existing and the new methods. The methods are inclusive of MRF, NN with CLAHE; ANFIS with MD, GANFIS+MD and FANFIS+MD. It can be seen from this graph that the newly introduced and FANFIS+MD reveals a higher recall value in comparison with the other available system

**Sensitivity (SEN):** Sensitivity is also known as True Positive Rate and is defined as the probability of the actual positive classes that are correctly detected.

$$SEN = \frac{TP}{(TP + FN)} * 100 \tag{23}$$

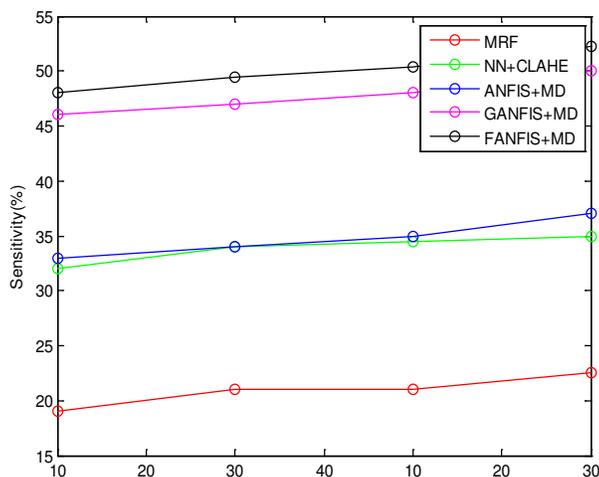


Figure 11: Sensitivity

Fig 11 shows the sensitivity metric comparison made between the already existing and the new methods. The methods are inclusive of MRF, NN with CLAHE; ANFIS with MD, GANFIS+MD and FANFIS+MD. It can be seen from this graph that the newly introduced GANFIS+MD provides a higher sensitivity value in comparison with the available system.

**Specificity (SPE):** Specificity (or) True Negative Rate is defined to be the probability of the actual negative classes, which are correctly detected.

$$SPE = \frac{TN}{(TN + FP)} * 100 \tag{24}$$

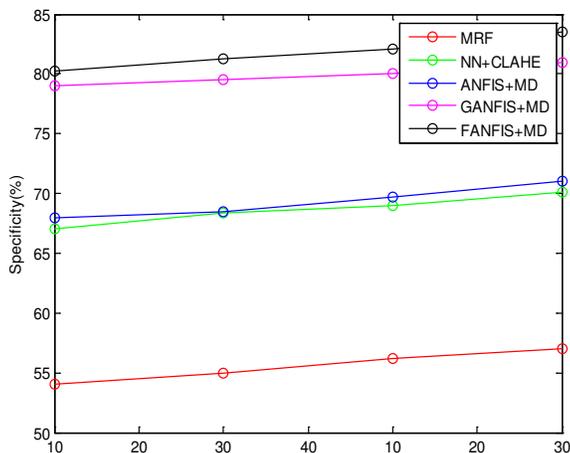


Figure 12: Specificity

Fig 12 shows the specificity metric comparison made between the already existing and the new methods. The methods are MRF, NN with CLAHE; ANFIS with MD, GANFIS+MD and FANFIS+MD. It can be seen from this graph that the newly introduced and FANFIS+MD yields a higher specificity value in comparison with the other available system.

**F-measure:** F-measure of the system is defined to be the weighted harmonic mean of its precision and recall.

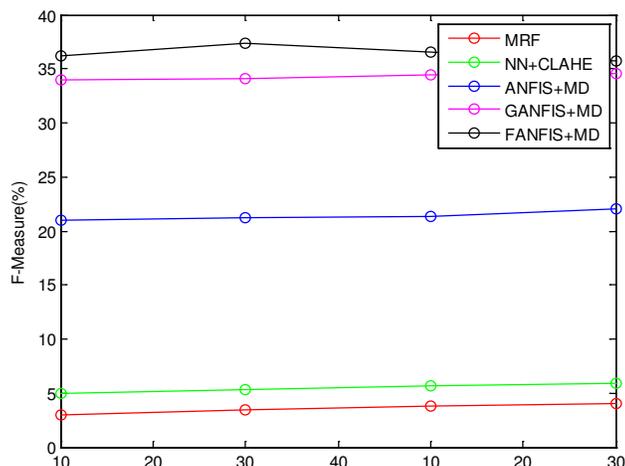


Figure 13: F-Measure

Fig 13 shows the f-measure metric comparison made between the already existing and the new methods. The methods are inclusive of MRF, NN with CLAHE, ANFIS with MD, GANFIS+MD. It can be seen from this graph that the newly introduced and FANFIS+MD provides a higher f-measure value in comparison with the other available system.

## V. CONCLUSION

The new system showed a novel scheme for the blood vessels segmentation and optic disk in retinal image. The denoising and enhancement of the images are performed by using HTDCE-AHE, which helps in enhancing the quality of images in an essential way. Adaptive Markov Random fields, segmentation of an optic disk are performed in this system. Then, MPSO with HS algorithm for efficient feature selection is performed in order to guarantee the Retinal Vessel Segmentation. At last, the detection of vessels is carried out by making use of FANFIS with MD. It shows itself to be very effective in retinal blood vessel segmentation. At last the extraction of GLCM features is done that yields good information regarding the existence of diseases like Glaucoma, Macular Degeneration that is age related. The new FANFIS with MD approach is used for providing an efficient increase in classification results with comparison of other approaches.

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