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The Effects of National Examination PROTECTION Convergence Education Program on Ego-Resiliency, Social Support, and Job-Seeking Stress of Senior Nursing Students

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Abstract

Purpose: *The purpose of this study is to examine the effects of the National Examination Protection Convergence Education Program conducted through 18 sessions for underperforming nursing students on their ego-resiliency, social support, and job-seeking stress*

Method: *The National Exam Protection Convergence Education Program comprised of special lectures for eight subjects of the national examination for nurses was carried out by full-time professors of each of the major subjects three times a week for a total of 18 sessions. It is one group pretest-posttest quasi-experimental research comparing 66 nursing students with an average GPA of 3.0 or less(out of 4.5) before and after the education program. The participants were interviewed by academic advisers from time to time.*

General characteristics were examined by actual numbers and percentages and pre-post analysis of ego-resiliency, social support, and job-seeking stress for the national examination education program was conducted through paired sample t-test using SAS 9.3 program.

Results: *As a result of analyzing the changes in ego-resiliency, social support, and job-seeking stress before and after the National Examination Protection Convergence Education Program, it was found that the average for ego-resiliency and social support significantly increased from 3.52 to 3.78(t=5.16, p=<.000) and 3.89 to 4.04(t=2.61, p=<.011), respectively. On the other hand, no significant difference was found in job-seeking stress before and after the program(t=1.15 p=.253).*

Conclusion: *The study was conducted to understand the effects of a national examination education program by making comparisons of data obtained before and after an 18-session, 40-hour education program for underperforming students, and it revealed significant differences in ego-resiliency and social support before and after the education program; however, there found no change in job-seeking stress.*

[Keywords] ***Education, Nursing Students, Ego-Resiliency, Social Support, Job-Seeking Stress***

1. Introduction

1.1. Purpose

College students go through an important period of adolescence, and it is reported that about 56% of nursing students have a very high level of stress. This is due to unique stressors such as studying itself, academic anxiety, and uncertainty about one's own abilities, and exposure to such stresses can affect academic life[1]. In fact, anxiety about test preparation and evaluation is one of the factors of academic stress which affects the academic life of nursing students[2][3][4].

Nursing students have a very high level of pressure to pass the national exam and get a job[5]. It is reported that the level of test anxiety among senior nursing students, who have a national examination ahead of them, is high and test anxiety of underperforming students is

even higher[6]. This is because underperforming students tend to frustrate and give up their studies, repeating test failures[7]. In addition, the national examination for nurses is a once-a-year examination, which is directly related to getting a job as a nurse, and the failure in the national examination oppresses the students as they have to wait a year to retake the examination.

Therefore, it is necessary for underperforming senior nursing students to have strategies to well prepare for the national exam and to reduce anxiety and stress about getting a job. Students feel motivated and learn more effectively in a learning environment based on mutual trust between professors and students[8]. In particular, universities around the world were closed due to COVID-19, affecting more than 1.57 billion students in 191 countries[9]. In fact, 75.9% of those in their twenties who suffer from anxiety and depression due to COVID-19 said that they feel anxiety even in their daily life[9][10]. In this year, the number of non-face-to-face classes increased due to the global pandemic COVID-19, and the need for flexibility also increased to adjust behaviors by positively adapting and appropriately responding to changes in circumstances caused by social distancing[11]. Nursing students must have the ability to flexibly cope with anxiety and stress in order to fulfill their responsibilities in their future careers and to serve the role of health care providers[1].

Such flexible coping strategy is ego-resiliency[12], and ego-resiliency can significantly lower anxiety[13]. High ego-resiliency promotes individual success by overcoming challenges and adversities[1]. It is also a factor that helps adapting to stressful situations[12] and reported to increase life satisfaction by 1.15 times[1]. As such, ego-resiliency is a crucial factor for academic success and an essential skill for professional nurses[14].

Social support, along with ego-resiliency, is a factor that lowers anxiety[13] and reported to increase the level of ego-resiliency by 1.37 times[1]. In particular, the higher the social support from friends, the higher the level of ego-resiliency[1]. As such, social support is an important predictor of academic performance[15]. Although research on national test anxiety among senior nursing students has been conducted[6][7], it focused only on the current psycho-emotional state of the students. No study has been conducted to examine the effects of a national examination education program or an intervention program to reduce national examination anxiety composed of advisory counseling and special lectures for underperforming senior students on their ego-resiliency, social support, and job-seeking stress. Pass rate for national exams is a factor that affects the reputation of a university[16]. Therefore, instructors should help students pass the exam, and integrate the efficiency of teaching methods and evaluation process throughout the curriculum[16][17]. Instructors should advise students on how to get the best results and engage actively, especially for those at risk of failure[18]. As such, the factors of student success include grades and instructors[16][19], and the convergence program composed of 18 special lectures on national examinations and continuous counselling with academic advisors for underperforming senior nursing students will be a quality indicator for nursing education programs.Helpful and accurate advice is very important for underperforming students. It is necessary to provide test strategy and relieve test anxiety for underperforming students, and helping them to predict the test result through simulation before taking the test is alsocrucial[10]. Students have expectations from their instructors, and communication between students and instructors also affects students' attitudes[20]. Such a convergence education program with 18 special lectures on national examinations and supportive encouragement and sympathy of supervisor for underperforming students will be a factor in promoting students' willingness to study[9]. Convergence education programs with sympathy and support of supervisors for nursing students will cultivate emotional ego-resiliency by improving learning outcomes and relieving stress. Ego-resiliency is an important attribute to withstand stress, achieve academic success, and have a career as a nurse[21]. As a gateway to becoming a nurse, passing the national exam affects nursing students' employment and future career and is an important indicator of educational performance of universities. In addition, the convergence education program expected to play the role of universities

in meeting the expectations of society and producing educational services and that of instructors in students' learning and academic achievement[19][20].

Therefore, in this study, the impact of 40 hours of 18-session education program for senior students, which is an intervention program to reduce national test anxiety, on their ego-resiliency, social support, and job-seeking stress was examined in order to provide fundamental data for senior nursing students' preparation for the national examination for nurses.

2. Method

2.1. Research design

It is one group pretest-posttest quasi-experimental research conducted to examine the effects of national examination education program on ego-resiliency, social support, and job-seeking stress.

2.2. Research subjects

The subjects of this study are senior nursing students in a region who participated in the national examination education program. 76 senior students with an accumulated average GPA of 3.0/4.5 or less at the end of the 1st semester of the 4th year were selected. Of the 76 subjects selected for the national examination education program, 71 subjects, excluding 5 participants who were eliminated due to truancy and frequent absences, were selected as the final subjects. The number of research subjects was calculated to be 43 when analyzed with an significance level(α) of .05, statistical power(1-β) of .90, and effect size of 0.30 in the middle using G power 3.1.6 program. In other words, considering 15% dropout rate, 71 participants with a sufficient sample size participated in this study.

2.3. Treatment

The 18-session, 40-hour national examination education program was conducted for a minimum of 2 hours per week for 6 weeks by nine professors who are both full-time professors of the eight subjects of the national examination for nurses and academic advisors for the 4th grade students. The eight subjects are Adult Nursing, Basic Nursing, Community Nursing, Mental Health Nursing, Maternal Nursing, Nursing Management, Child Nursing, and Health and Medical Laws. 18 sessions consisted of a total of 40 hours or a minimum 2 hours per week from 4pm to 6pm on Mondays, Wednesdays and Thursdays for 3 days each week during the 6-week period <Table 1>.

The national examination education program, consisted of a total of 40 hours, including 8 hours of Adult Nursing, 6 hours each of Health and Medical Laws and Community Nursing, and 4 hours each of Basic Nursing, Maternal Nursing, Mental Health Nursing, Child Nursing, Nursing management, was held from October 26, 2020 to December 19, 2020. Materials for the special lectures, such as textbooks, handouts, and published workbooks, were prepared considering the characteristics of each subject.

71 out of the 76 participants attended the first session of the national examination education program. Prior to the start of the educational program, the subjects were interviewed by each of the academic advisors. During the 18 sessions, absence was recognized only for conflicts with a job interview or examination, and an orientation was held by each advisor to notify that three or more unexcused absences would result in elimination from the educational program. The academic advisors ensured that the subjects participate the 18 sessions without being absent. Face-to-face and non-face-to-face interviews were carried out before each session to confirm the attendance of the subjects. Such subject management was for the concern of potential decline in the self-esteem of the subjects since they are stigmatized as an underperforming student as well as to improve student motivation for learning by forming emotional support through a close contact with the advisors and creating a learning environment based on mutual trust[8]. Advisors were assigned to each session to

check the attendance of every research subject participating in the education program using an attendance book. A sticker was distributed to attendees for them to put the sticker on the attendance book with their name written on after each class. This was to ensure that the subjects participate in the educational program with a sense of responsibility and was a minimum management measures to prevent other students from participating in the special lectures.

Since the session for the special lecture on the health and medical laws was held in the midst of COVID-19 when the number of confirmed COVID-19 patients in the region where the university is located was rapidly increasing, attendance was not required for the session. For this session only, 42 out of the 66 participants attended the lecture. A total of 5 students were absent due to a job interview during the 18 sessions of the national examination education program. In each session, there were at least 1 to 4 absences.

Table 1. Composition of the national examination education program.

Session	Subject	Time	Method
1	Adult nursing	2	Textbook, handout, workbook
2	Adult nursing	2	Textbook, handout, workbook
3	Basic nursing	2	Textbook, handout
4	Adult nursing	2	Textbook, handout, workbook
5	Community nursing	2	Workbook, handout
6	Mental health nursing	2	Handout
7	Maternal nursing	2	Publisher summary
8	Community nursing	2	Workbook, handout
9	Basic nursing	2	Textbook, handout
10	Nursing management	2	Textbook, supplementary textbook, handout
11	Child nursing	2	Handout
12	Mental health nursing	2	Handout
13	Maternal nursing	2	Handout
14	Nursing management	2	Textbooks, supplementary textbooks, handouts
15	Child nursing	2	Handout
16	Adult nursing	2	Textbook, handout, workbook
17	Community nursing	2	Textbook, handout
18	Health and medical laws	6	Handout
	8 subjects	40 hours	

2.4. Research tool

2.4.1. Ego-resiliency

Ego-resiliency refers to the tendency to adapt flexibly to difficult situations and activate various coping strategies[22]. The tool used by Nayeon Eom[23] was used as the resilience scale for college students in this study. The ego-resiliency tool consisted of a total of 16 questions which have three sub-areas(positive future orientation, emotion regulation, and diversity of interests). The higher the

score on a 5-point scale, the higher the level of ego-resiliency. The score was .85 in the study of Nayeon Eom(2014)[23] and .891 in this study.

2.4.2. Social support

Social support is a verbal and non-verbal message that conveys emotions or information which helps reduce uncertainty or stress[8]. In this study, a tool modified and supplemented by Hyunjin Lee(2008)[24] was used. Social support consisted of a total of 25 questions which have 4 sub-areas(emotional support, material support, informational support, and evaluative support). The higher the score on a 5-point scale, the higher the level of social support. The score was .97 in the study of Hyunjin Lee(2008)[24] and .983 in this study.

2.4.3. Job-seeking stress

Job-seeking stress refers to a state of physical and psychological tension in which a prospective college graduate experiences difficulties subjectively in the process of preparing for employment[23]. In this study, a tool modified and supplemented by Yuri Kang(2006)[25] based on Cornell University's Cornell Medical Index(CMI) was used. The job-seeking stress tool consisted of a total of 22 questions which have 5 sub-areas(personality stress, family environmental stress, academic stress, college environmental stress, and job-seeking anxiety stress). The higher the score on a 5-point scale, the higher the level of job-seeking stress. The score was .78 in the study of Yuri Kang(2006)[25] and .963 in this study.

2.5. Ethical considerations

For the ethical considerations of the study, a written consent for the study was received from the participants only after a sufficient explanation of the purpose of the study was given to the subjects. It was explained that the personal information obtained in this study is confidential and participation in the study can be withdrawn at any time without any harm or disadvantage. Completed questionnaires were collected by the researcher along with a written consent for the research.

2.6. Data collection method

The procedure of this study consisted of pre-investigation, experimental treatment, and post-investigation, and data were collected using a structured self-report questionnaire from October 26 to December 21, 2020. For the pre-investigation, the general characteristics, ego-resiliency, social support, and job-seeking stress were examined in advance on October 26. The questionnaires were handed out by the researcher and collected 3 days after by instructing the students to put them in the collection box provided in the student lounge after the first program. Experimental treatment was conducted for a total of 18 sessions, first 17 sessions for 2 hours and the last session for 6 hours. For the post- investigation, the professorsdistributed questionnaires immediately after when the program was terminated on December 21, 2020, and a collection box was provided in the student lounge for students' autonomous submission. Of the 71 questionnaires collected, a total of 66, excluding 5 subjects who responded unfaithfully, were analyzed.

2.7. Data analysis method

General characteristics were examined by actual numbers and percentages and pre-post analysis of ego-resiliency, social support, and job-seeking stress for the national examination education program was conducted through a paired sample t-test using SAS 9.3 program.

2.8. Research limitations

This study was limited to nursing students from one university without a comparative analysis with other universities. In addition, because the national examination education program was ap-

plied only to some students in their senior year, the result from this study alone cannot be expanded for a broad interpretation of the effects on ego-resiliency, social support, and job-seeking stress.

3. Result

3.1. General characteristics

General characteristics of the subjects include gender(Female(78.8%)), type of college admission(Occasional screening(86.4%)), motivation for selecting a nursing major(Employment(48.5%)), career after graduation(Hospital nurse(87.9%)), satisfaction with nursing major(Moderate(43.9%)), satisfaction with national examination education program(Satisfactory(54.5%)), effort for employment(Moderate(48.5%)), current employment status(Unemployment(56.1%)), and the most concerning factor in preparing for employment(College grades(47.0%)) <Table 1>.

3.2. Changes in dependent variables before and after the national examination education program

As a result of analyzing the changes in ego-resiliency, social support, and job-seeking stress before and after the national examination education program, the average for ego-resiliency increased from 3.52 points before the national examination education program to 3.78 points after the education program, showing significant improvement(t=5.16, p=<.000). Similarly, the analysis on the three sub-areas of ego-resiliency showed improvement after the national examination education program. The highest level of change was found in the sub-area Positive Future Orientation, which increased by .44 points, followed by Diversity of Interests and Emotion Regulation which respectively increased by .27 and .11 points <Table 2>.

Table 2. General characteristics. (N=66)

Variables	Categories	n(%)
Gender	Female	52(78.8)
	Male	14(21.2)
Type of college admission	Occasional screening	57(86.4)
	On-time screening	9(13.6)
Entering motivation	Aptitude	10(15.2)
	Employment	32(48.5)
	Recommendation	13(19.7)
	Longing	3(4.5)
	School grade	5(7.6)
	Volunteer and mission	3(4.5)
	Recognition	0
Desired work	Hospital nurse	58(87.9)
	Public official	1(1.5)
	Entered graduate	1(1.5)
	Not employed	4(6.1)
	etc.	2(3.0)
Nursing major satisfaction	Very dissatisfied	2(3.0)
	Dissatisfied	3(4.5)
	Moderate	29(43.9)
	Satisfied	27(40.9)
	Very satisfied	5(7.6)
Special lecture	Very dissatisfied	1(1.5)

satisfaction	Dissatisfied	3(4.5)
	Moderate	7(10.6)
	Satisfied	36(54.5)
	Very satisfied	19(28.8)
Effort for employment	No effort at all	0
	No effort	9(13.6)
	Moderate	32(48.5)
	Effort	22(33.3)
	Lots of effort	3(4.5)
Employment status	Employment	20(30.3)
	Unemployment	37(56.1)
	Not employed	9(13.6)
Concerning factor for employment	Interview	21(31.8)
	College grades	31(47.0)
	Certification	8(12.1)
	None	6(9.1)

The analysis on the changes in ego-resiliency, social support, and job-seeking stress before and after the national examination education program showed significant increase in the average for social support which increased from 3.89 points before the national examination education program to 4.04 points after the education program(t=2.61, p=<.011). Specifically, the analysis on each of the sub-areas of social support found improvement after the national examination education program. The highest level of change was found in the sub-area Information Support, which increased by .19 points, followed by Material Support(.17 points), Evaluative Support(.17 points), and Emotional Support(.08 points) <Table 2>.

The analysis on the changes in ego-resiliency, social support, and job-seeking stress before and after the national examination education program found the average for job-seeking stress to be 2.88 before the national examination education program and 2.89 after the education program(t=1.15 p=.253). However, when each of the sub-areas of job-seeking stress was analyzed, Personality Stress, Academic Stress, Job-Seeking Stress were decreased respectively from 2.98 to 2.94, 2.71 to 2.78 whereas Family Environmental Stress and College Environmental Stress were increased respectively from 2.89 to 2.96 and 2.82 to 2.84 <Table 2>.

Table 3. Comparison of ego-resilience, social support and job-seeking stress between pretest and posttest. (N=66)

Variables	Categories	Pre-test	Post-test	Difference	Paired t(*p*)
		M±SD.	M±SD.	M±SD.	
Ego-resilience	Positive future orientation	3.53±0.65	3.97±0.47	0.44±.56	
	Emotion regulation	3.37±0.53	3.48±0.31	0.11±.50	
	Diversity of interests	3.68±0.71	3.95±0.58	0.27±.55	
	All	3.52±0.53	3.78±0.34	0.26±.42	5.165 (<.000)
Social support	Emotional support	3.96±0.74	4.04±0.78	0.08±.57	
	Material support	3.85±0.73	4.02±0.77	0.17±.44	

	Informational support	3.86±0.74	4.05±0.80	0.19±.53	
	Evaluative support	3.87±0.75	4.05±0.83	0.17±.69	
	All	3.89±0.70	4.04±0.70	0.15±.47	2.618 (<.011)
Job-seeking stress	Personality stress	2.98±.55	2.94±.56	-.043±.30	
	Family environmental stress	2.89±.69	2.96±.73	.061±.34	
	Academic stress	2.94±.81	2.87±.89	-.064±.43	
	College environmental stress	2.82±.63	2.84±.79	.023±.45	
	Job-seeking anxiety stress	2.71±.65	2.78±.60	.061±.43	
	All	2.88±.52	2.89±.53	.018±.13	1.153 (<.253)

4. Review

The national examination education program was carried out to examine the effects of the program on ego-resiliency, social support, and job-seeking stress among underperforming senior nursing students. The results from the study are discussed in this section.

The national examination education program in this study was carried out to enhance the ego-resiliency and social support while reducing job-seeking stress of underperforming senior nursing students for 40 hours through 18 sessions by full-time professors for the eight subjects of the national examination for nurses. During the program, each student was interviewed time to time for emotional support and functional design of an academic plan for the national examination.

As a result of conducting the 18-session national examination education program three times a week, ego-resiliency showed a statistically significant increase from 3.52 points before the implementation of the program to 3.78 points after the implementation of the program. A study examining 933 students at 23 nursing colleges in the U.S. showed an ego-resiliency score of 3.44 points and demonstrated that the higher the ego-resiliency, the higher the sense of belonging and the less negative impact on academic performance[14]. A study analyzing 520 nursing students at Damanhour University reported that 56% of the nursing students have a high level of perceived stress, but high ego-resiliency increases life satisfaction by 1.15 times[1]. In addition, the study suggested that nurse educators should help nursing students increase their ego-resiliency through continuous encouragement and ability improvement, regularly monitor the students' stress level, and make intervention to appropriately reduce their stress[26]. Also in this study, academic advisors, who conducted interviews on a regular basis in order to prevent the participants from being stigmatized as an underperforming student and encouraged the students to increase self-esteem to enable them to set up an academic plan, seem to have played a vital role in increasing the ego-resiliency. Though direct comparative study is not feasible as the research method is different, but an ego-resiliency score of 3.75 for 2nd~4th grade nursing students[27] is lower compared to the score of 3.52 and 3.78 observed before and after the educational program, respectively. Similarly, 3rd~4th grade nursing students were found to score 2.80 points[28] for their ego-resiliency, indicating that the subjects of this study have a relatively high ego-resiliency. The university's curriculum requires clinical training even in the second semester of the fourth year, and it was difficult to prepare for the national exam by paralleling practice and theory. In addition, due to COVID-19, out of the 15 weeks in the second semester of the 4th year, which is composed of 4 weeks of practical training and 11 weeks of theory

education, 2 weeks were non-face-to-face classes, the university replaced clinical training at a third party institute with clinical training at the university as the number of confirmed COVID-19 cases increased, and there were students who were self-isolated after contacting a person who had a close contact with a COVID-19 patient. In short, it was a stressful situation to prepare for the national examination or employment. Ego-resiliency is the factor that helps adapting to such a stressful situation[26]. In this manner, the score seems to have increased after the education program as the participants recovered themselves by finding positive meanings and utilizing effective control mechanisms, making future plans as a nurse, and setting dreams and goals. This is in line with the highest change found in the score of the sub-area 'positive future orientation' of ego-resiliency which increased from 3.53 points to 3.97 points. Ego-resiliency enables flexible responses and implementation of effective coping strategies[26]. On the other hand, the changes in emotion regulation were found to be negligible. Ego-resiliency is a factor that is linked to an individual's disposition or personality[22], and changing an individual's disposition during the short period of 18 sessions is obviously difficult. High social support from friends is known to make a high level of ego-resiliency which is developed and promoted through socialization by adapting to a dynamically changing environment[26][29]. Therefore, in order for underperforming students to cultivate ego-resiliency, continuous encouragement, guidance, and counseling and regularly monitoring for academic performance are necessary.

Social support in this study showed a statistically significant increase from 3.89 points found before applying the national examination program to 4.04 points measured after the application. The social support score of senior nursing students at three universities measured about 30 days before the national examination was 3.72 points, and the professor support showed the lowest points of 3.14[6]. Social support reduces uncertainty or stress by exchanging verbal and non-verbal messages. and social support is argued to be effective when students receive frequent feedback from professors in a learning environment based on mutual trust[8]. A study examining nursing students in Brazil demonstrated that family and friends are the biggest resources of support and social support lowers academic stress[30]. In this study, 18 special lectures on the subjects of the national examination for nurses were provided and textbooks, workbooks, and/or handouts were used for each of the subjects considering the academic level of the underperforming students. It is assumed that the students have set up their own plan for the national examination as their performance in trial examinations gradually increased. This can be set beside the biggest change found in the score of sub-area 'informational support'of social support which increased from 3.86 points to 4.05 points. However, the score for emotional support increase from 3.96 points to 4.04 points, showing a negligible increase during the 18 sessions. This seems to be due to the fact that the national examination day was nearing and test anxiety increased as the number of sessions completed increased. Since test anxiety is related to both internal and external characteristics[8]. it is considered that national test anxiety was not significantly reduced despite the various forms of support through affection, interest, and empathy provided by the professors who gave lectures or advices to the underperforming students during the 18 sessions. The results suggest that psychosocial support for the students preparing for a national examination requires a step-by-step and systematic approach, rather than a one-time approach. 95.7% of nursing students are in a stressful situation, and 42.1% of the respondents feel depressed when they are under stress. In particular, in 2020, 75.9% of those in their twenties who suffer from anxiety and depression due to COVID-19 responded to feel anxiety even in their daily life[10]. Therefore, although professors focus on students' learning, recognizing and understanding students' emotional needs, rather than teaching itself, can help nursing students successfully complete their degree course[8]. Social support should include everyone with whom nursing students are involved, and emotional support, in particular, is associated with improving self-esteem[31]. Since social support is a factor that correlates with academic performance[22], it should play a buffer role for various stressors by providing social support and monitoring stress for underperforming students. In a university environment where classes are held on a non-face-to-face basis due to COVID-19, improving self-esteem, which is an important variable in college life, is considered

necessary[10]. Responses to stress may result in personal growth through psychological maturity and resources such as social support[29].

Although job-seeking stress in this study increased from 2.88 points before applying the national examination program to 2.89 points after the application, there was no statistically significant difference. However, among the sub-areas of job-seeking stress, personality stress, which resulted from an individual's unique behaviors, was reduced from 2.98 points to 2.94 points after the program. Similarly, the score for academic stress, which refers to the overall stress arising from academic problems related to employment, decreased from 2.94 points to 2.87 points. The job-seeking stress score of the subjects of this study was found to be much higher compared to the job-seeking stress among 2nd~4th nursing students(2.11 points)[27], 3rd ~ 4th nursing students(2.10 points)[28], engineering students(2.53 points), and students who major in social science(2.27 points)[32].

84% of nursing students identify uncertainty about the future and fear for failure as a stressor[33]. Moreover, 1/3 of nursing students experience severe stress, such as anxiety and depression. In fact, becoming anxious and having low self-esteem before the last exam or making a negative self-assessment is a stress-inducing factor[34]. As the interest in jobs increases, the level of stress also increases[35] Convergent factors affecting job-seeking stress are grade, academic performance, and self-esteem[27][28]. In particular, as the grade increases, the level of job-seeking stress increases, and the level of job-seeking stress may vary by major depending on the changes in social environment and other factors[32]. In addition, nursing students have a higher level of stress compared to students who have a different major. Tests were found to act as a stressor with a stress score of 2.89 points[36]. In particular, this year, anxiety, depression, and stress among college students were very serious due to the global pandemic, COVID-19, making focusing on learning and studying even more difficult[11].

The subjects of this study are considered to have a high level of job-seeking stress because they are stigmatized as an underperforming student and are senior students who need to take the national examination soon. Therefore, positive reevaluation is required for the students in their senior year, especially for underperforming senior students, and social support, which is guidance from peers, and a full support system of the school should be provided. It is because guidance from peers and experts helps students complete the curriculum, and such support is a factor that improves self-esteem and satisfaction[11]. In addition, psychological and emotional state plays an important role in determining an individual's behaviors and serves as a factor influencing job-satisfaction and commitment to an organization as a nurse[37]. In particular, when nursing students have confidence in their performance, they improve their problem-solving ability and promote individual learning process by equipping themselves with the knowledge, skills, and attitudes required in the clinical field[38]. Therefore, it is necessary to make nursing students confident so that they can successfully pass the national examination and display their capabilities as a nurse in the future.

5. Conclusion

The results of this study show that the national examination education program composed of special lectures on the 8 subjects of the national examination for nurses and interviews with academic advisors has an effect on the ego-resiliency and social support for underperforming students. Since the ego-resiliency of nursing students is a factor that promotes success for the students to develop toward their goals[14], nurse educators should consider incorporating ego-resiliency training programs into the academic curriculum by improving ego-resiliency and creating a positive and supportive learning environment for nursing students' success. In addition, because positive social support, such as support from family and friends, is necessary for such an ego-resiliency training program and social support can prevent school maladjustment and predict academic performance[39], follow-up research should be conducted to construct a support system composed of instructors and families.

The convergence education program consisted of advisors' counseling for their encouragement and support and instructors' special lectures for academic performance for nursing students in order

for the students to recognize and reduce stress when studying. Such programs will enable students to lead a successful life as a nurse in the future. Also, achievements and confidence obtained through ego-resiliency will play an important role in solving problems and making improvements on one's own, promoting integral and logical thinking[40].

Since this study is based on one group pretest-posttest design without a control group, a pretest-posttest test with a control group and a follow-up study with a time difference are deemed necessary for the continuity of the program effects.

6. References

6.1. Journal articles

[1] Elzohary NW & Mekhail MN & Hassan NI & Menessy RFM. Relationship between Ego Resilience, Perceived Stress and Life Satisfaction among Faculty Nursing Students. *Journal of Nursing and Health Science*, 6(6), 57-70 (2017).

[2] Cohen S & Kamark T & Mermelstein L. A Global Measure of Perceived Stress. *Journal of Health and Social Behavior*, 24(4), 385-396 (1983).

[3] Ross R & Zeller R & Srisaeng P & Yimmee S & Somched S & Sawatphanit W. Depression, Stress, Emotional Support and Self-esteem among Baccalaureate Nursing Students in Tailand. *International Journal of Nursing Education Scholarship*, 2(1), 124-134 (2005).

[4] Obizoba C. Mitigating the Challenges of Objective Structured Clinical Examination(OSCE) in Nursing Education: A Phenomenological Research Study. *Nurse Education Today*, 68, 71-74 (2018).

[5] Choi KB. A Study on Stress, Self-esteem and Resilience for Korean Nursing Students' Safety Man agement. *International Journal of Crisis & Safety*, 4(1), 8-18 (2019). [Article]

[6] Noh YG & Lee YS. Influence of Self-efficacy and Social Support on Test Anxiety among Nursing Stu dents Taking the National Examination for Registered Nurses. *The Korea Contents Association*, 16(11), 633-643 (2016).

[7] Lee SH & Kim JK. Impact of Self-esteem and Test Anxiety on Mental Health among Nursing Students Taking the National Examination for Registered Nurses. *The Korean Academic Society Nursing Education*, 16(2), 177-185 (2010).

[8] Reeve KL & Shumaker CJ & Yearwood EL & Crowell NA & Riley JB. Perceived Stress and Social Support in Undergraduate Nursing Students' Educational Experiences. *Nurse Education Today*, 33(4), 419-424 (2012).

[9] González JG & Ruqiong W & Rodriguez AR & Mullor MR & Ding C & Miranda MIW. Analysis of Anxiety Levels of Nursing Students Because of E-learning during the Covid-19 Pandemic. *Healthcare*, 9(3), 252 (2021).

[10] Kim JN & Lim YJ. The Relationship between Self-esteem and Gratitude Tendency of University Students during the Corona-19 Era of Human Disaster. *International Journal of Human & Disaster*, 6(1), 26-35 (2021). [Article]

[11] Choi JO & Oh SN & Cho MS. University Students' Learning Behavior, Online Learning Satisfaction, University Satisfaction, and Emotional Difficulties according to ADHD Tendencies and Gender in Covid-19 Crisis. *International Journal of Crisis & Safety*, 6(1), 51-67 (2021). [Article]

[12] Letzring TD & Block J & Funder DC. Ego-control and Ego-resiliency: Generalization of Self-report Scales based on Personality Descriptions from Acquaintances, Clinicians, and the Self. *Journal of Research in Personality*, 39(4), 395-422 (2005).

[13] Taylor ZE & Eienberg N & VanSchyndel SK & Wilkens NDE & Pinrad TL. Children's Negative Emotions and Ego-resiliency: Longitudinal Relations with Social Competence. *Emotion*, 14(2), 397-406 (2014).

[14] Mcdermott RC & Fruh SM & Williams & Hauff C & Grave RJ & Melnyk BM & Hall HR. Nursing Students' Resilience, Depression, Well-being, and Academic Distress: Testing a Moderated Mediation Model. *Journal of Advanced Nursing*, 76(12), 3385-3397 (2020).

[15] Luo Y & Wang H. Correlation Research on Psychological Health Impact on Nursing Students against Stress, Coping way and Social Support. *Nurse Education Today*, 29(1), 5-8 (2009).
[16] Tooren MVD & Jonge JD. Managing Job Stress in Nursing: What Kind of Resources Do We Need?. *Journal of Advenced Nursing*, 63, 75-84 (2008).
[17] Mahajan R & Singh T. The National Licentiate Examination: Pros and Cons. *The National Medical Journal of India*, 30(5), 275-278 (2017).
[18] Burt ALK & Woods S & Daily SM & Lilly CL & Scaife B & Davis D. Predicting Student Success on the National Board for Certification in Occupational Therapy Examination. *The American Journal of Occupational Therapy,* 74(4), 7404345020 (2020).
[19] Handerson D & Sewell KA & Wei H. The Impacts of Faculty Caring on Nursing Students' Intent to Graduate: A Systematic Literature Review. *International Journal of Nursing Sciences*, 7(1), 105-111 (2020).
[20] Ghiyasvandian S & Bolourchifard F & Yekta ZP. Humanistic Approach to Nursing Education: Lived Experiences of Iranian Nursing Students. *Global Journal of Health Science*, 7(2), 87-93 (2015).
[21] Chow KM & Tang WKF & Chan WHC & Sit WHJ & Choi KC & Chan S. Resilience and Well-being of University Nursing Students in Hong Kong: A Cross-sectional Study. *BMC Medical Education*, 18(13), 1-1 (2018).
[22] Ziarko M & Mojs E & Sikorska D & Samborski W. Coping and Life Satisfaction: Mediating Role of Ego-resiliency in Patients with Rheumatoid Arthritis. *Medical Principles and Practice,* 29, 160-165 (2020).
[26]Ching SSY & Cheung K. Factors Affecting Resilience of Nursing, Optometry, Radiography and Medical Laboratory Science Students*. International Journal of Research and Public Health*, 18(8), 3867-3867 (2021).
[27] Yang SA. Convergence Analysis of the Factors Influencing Job-seeking Stress in Nursing Students. *Journal of Convergence for Information Technology,* 7(4), 171-183 (2017).
[28] Chae MO. Ego Resilience, Career Decision-making Self-efficacy and Job Seeking Stress of Senior Nursing Students. *Journal of Digital Convergence*, 17(4), 229-238 (2019).
[29] Song KJ & Lee JY. The Effect of Military Life Stress and Ego-resilience on Adjustment of Soldiers. *International Journal of Terrorism & National Security,* 1(2), 19-27 (2016). [Article]
[30] Almeida LY & Carrer MO & Souza J & Pillon SC. Evaluation of Social Support and Stress in Nursing Students. *Rev Esc Enferm USP*, 29(52), 1-1 (2018).
[31] Halanmandaris KF & Power KG. Individual Differences, Social Support and Coping with the Examination Stress. *Personality and Individual Differences*, 26, 665-685 (1999).
[32] Lee YK & Kang KH. The Analysis about Employment Stress and Career Decision Efficacy of Undergraduates -In Focus of Engineering and Social Science Colleges. *Journal of Engineering Education Research,* 14(2), 60-67 (2011).
[33] Parveen A & Inayat S. Evaluation of Factors of Stress among Nursing Students. *Journal of Advanced Practices in Nursing,* 2, 2-4 (2017).
[34] Quinn BL & Peters A. Strategies to Reduce Nursing Student Test Anxiety: A Literature Review. *Journal of Nursing Education,* 56(3), 145-151 (2017).
[35] Alvarez HAO & Vasquez EP & Slavich GM & Laurent JGC & Browning M & Lopez GM & Robbins L & Spengler JD. Stress and Health in Nursing Students. *Nursing Research*, 68(6), 453-463 (2019).
[36] Kang DH & Boss L & Barrientos M & Perikala S & Cron S. Stress-related Bio Behavioral Profile of Senior Nursing Students. *Journal of Nursing Education and Practice*, 5(6), 129-140 (2015).
[37] Kim JH & Kang KN. Examination of the Role of Self-efficacy and Development of an Integrated Model to Overcome Nursing Staff Shortage Crisis at Small and Medium Sized Hospitals in Korea. *International Journal of Crisis & Safety,* 3(1), 1-16 (2018). [Article]
[38] Han SY. A Study on Nursing College Students' Knowledge, Attitude, Confidence in Performance and Practice on Patient Safety Management in Korea. *International Journal of Crisis & Safety,* 3(4), 18-26 (2018). [Article]
[39] Lasarte OF & Diaz ER & Palacios EG & Fernandez AR. The Role of Social Support in School Adjustment during Secondary Education. *Psicothema*, 32(1), 100-107 (2020).

[40] Kang YD. A Design on Teaching and Learning Method for Creative Talent in the Fourth Industrial Revolution. *International Journal of Human & Disaster*, 5(1), 1-9 (2020). [Article]

6.2. Thesis degree

[23] Eom NY. The Relationship between Job-seeking Stress and Depression, Psychological Well-being: Moderating Effects of Ego-resiliency and Social Support among Students Who are Preparing for Employment. Konkuk University, Master's Thesis (2015).
[24] Yi HJ. A Study on the Relation between Perceived Social Support and Career Attitude Maturity with Career Preparation Behavior of Undergraduate. Ewha Womans University, Master's Thesis (2009).
[25] Kang YR. The Influence of Jobs Seeking Stress on Their Career Maturity Dance Majoring Students. Dankook University, Master's Thesis (2006).

7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Author	YK	-Set of concepts☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑ -Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑

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The Effect of Professional Awareness of Sports Leaders on Role Expectations and Service Satisfaction among Sports Participants to PROTECT the Sports Market

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Abstract

Purpose: *Sports leaders need systematic and professional knowledge acquisition, social approval of professional authority and privileges, and social contribution services in order to receive trust and recognition from sports participants. Sports leaders should be recognized by sports participants through their efforts to cultivate professionalism. This is especially important for sports participants because it has a lot of influence on sports activities as a whole, such as continuous participation or suspension of exercise by sports leaders' awareness of professionalism. Therefore, this study is meaningful in presenting data for the development of sports leaders' qualifications and efficient operation of related institutions to provide excellent service in sports facilities through a study on the impact of professional awareness on sports leaders.*

Method: *As of 2021, the purpose of the survey was explained to the users of 5 sports facilities in Daegu Metropolitan City by personally visiting the sports centers they are using. A questionnaire survey was conducted using the self-evaluation writing method of 350 people who agreed to write the questionnaire. Among the collected data, 319 questionnaires were taken as valid samples, excluding the data whose responses to the questionnaire were not faithful or part of the survey contents were omitted. In this study, frequency analysis was performed to find out the general characteristics of survey participants using SPSS Pro-gram 25.0, and factor analysis and Cronbach's α coefficient were calculated to verify the validity and reliability of the questionnaire. In addition, correlation analysis was performed to find out the relationship between variables, and multiple regression analysis was performed to find out the influence of the variables.*

Results: *As a result of factor analysis and reliability verification for professional recognition, the Eigen valueand Cronbach's α coefficient of the occupationally factor were 5.359(α=.927), and the ideological factor was 4.147(α=.859). As a result of factor analysis and reliability verification for Role Expectation, the Eigen value and Cronbach's α coefficient of the relationship factor were 5.824(α=.845), the expertise factor 5.124(α=.802), and the role factor 4.382(α=.837), and the outcome factor was 3.762(α=.765). As a result of factor analysis and reliability verification for service satisfaction, the Eigen value and Cronbach's α coefficient of the service satisfaction factor was 9.457(α=.945). As a result of performing correlation analysis using SPSS, the relationship between all constituent concepts It appears as a positive(+) correlation, and the direction of the relationship between the variables is consistent. In the effect of sports participants' professional perception of sports leaders on Role Expectation and service satisfaction, professional perception affects Role Expectation and service satisfaction, and Role Expectation affects service satisfaction.*

Conclusion: *Professional perception affects Role Expectations. Professional perception affects service satisfaction. Role Expectation affects service satisfaction. Therefore, in order for sports leaders to be recognized as professionals and provide quality services, they must first clearly recognize that they are professional, acquire professional knowledge for work and cultivate culture, mature personality and high responsibility, ethical awareness, and service. There is a need for continuous efforts that can be trusted by users of facilities and services.*

[Keywords] ***Sports Participants, Sports Leaders, Professional Recognition, Role Expectation, Service Satisfaction***

1. Introduction

1.1. The needs and purpose of the study

In modern society, working hours have been shortened and leisure time has increased due to the five-day work week, and in the case of lifestyle, the standard of living has improved with the change from work-centered to leisure-oriented[1][2]. From this perspective, as modern people become increasingly interested in health, more and more people are using leisure from a physical perspective, and as a result, there is a social trend that uses leisure sports as an opportunity to maintain health and maintain emotional stability to improve quality of life[3][4]. In particular, sports activities as a leisure activity of modern people are shown to be higher than other leisure activities, which means that more people choose exercise as a leisure life at the same time as interest in health increases and social awareness changes[5][6][7]. A high interest in health is vitalizing the participating sports market and sports facilities, but the operation of sports facilities due to excessive competition is expected to face a very serious crisis. This change also provides an environment where users can enjoy various and high-quality leisure sports activities in the future, but from the manager's point of view, it becomes an infinite competitive market, whether it is a public facility or a commercial facility. In other words, it is inevitable for the sports industry to shift from a supplier-oriented market to a user-oriented market[8].

In the case of leaders who conduct education for users in the sports market, they play a pivotal role in sports activities, such asstress relief from physical activity through voluntary participation of participants, mental and physical health promotion, expansion of sports base, and the activation or contributionto sports[9][10]. Sports Leaders should receive the necessary training and education for a considerable period of time, have wide autonomy and a sense of responsibility accordingly, and comply with an autonomous organizational system and code of conduct more importantly than economic income for the performance of a given task[11], In order for Sports Participants to be trusted and recognized as leaders, they must have systematic and professional knowledge and social approval of the authority and privileges of the profession. In addition, it is imperative that people with expertise provide services that contribute to society[12].

In other words, Sports Leaders need constant efforts to foster professionalism, which should be recognized by Sports Participants, which is very important because Sports Participants can emerge as the continuous participation or suspension of exercise by professional and positive perceptions of Sports Leaders[13][14].

Therefore, this study is meaningful in presenting data for the cultivation of Sports Leaders' qualifications and efficient operation of related institutions to provide excellent service in sports facilities through a study on the impact of professional awareness on Sports Leaders.

1.2. Theoretical background and study hypotheses

Professions which based on systematic knowledge or principles obtained through long-term prescribed training, and educational institutions to learn related professional knowledge were established, and professional associations were established, and professions with their own code of conduct were called professions[15]. The degree to which members demonstrate superior performance in a particular field are attributes of members and follow expertise and skills, values of expertise and codes of conduct is called professional ability[16].

It is said that the role is the general expectation given to the position and the expectation of a specific person according to the position, and the normative expectation of the role action according to the position can be called a role.The role of a position is to expect general expectations granted to

a position and to a specific person according to a position, and it is said that normative expectations of role behavior in accordance with status can be called role[17][18].

Service Satisfaction is the result of the comparison between the customer's expectations for service quality and the performance of the service, and such Service Satisfaction is achieved through the evaluation of the service provision process, and it also affects the interaction between the service provider and the service user[19].

As the theoretical backgrounds related to Professional Recognition, Role Expectations, and Service Satisfaction show that they are related, this work establishes the following hypotheses:

Hypothesis 1. Professional perception will affect Role Expectation.

Hypothesis 2. Professional perception will affect Service Satisfaction.

Hypothesis 3. Role Expectation will affect Service Satisfaction.

2. Research Methods

2.1. Subjects and sampling technique

As of 2021, the purpose of the survey was explained to the users of 5 sports facilities in Daegu Metropolitan City by personally visiting the sports centers they are using. Since it was aimed at users of sports centers in Daegu, there is a limit to generalization. A questionnaire survey was conducted using the self-evaluation writing method of 350 people who agreed to write the questionnaire. Among the collected data, 319 questionnaires were taken as valid samples, excluding the data whose responses to the questionnaire were not faithful or part of the survey contents were omitted.

2.2. Measurement method

First, the background variables consisted of gender, age, duration of use, and participatory sports as general characteristics of the survey subjects.

Second, independent variables are Professional Recognition, and in the study of Yun-sik Kang, Gam-Sin, and Min-Hae Ye(1997), the factor loading amount of each occupational and ideological factors was .05 or higher, and the Cronbach's α coefficient was occupational(α=.68), ideological(α=.83)[20].

Third, the mediator was developed by Tinseley, Workman & Kass(1980) based on Role Expectations, and as a result of factor analysis in the research of Myung-ja Geum, Mi-jinYang(2001), and Hye-rim Lim(2016), the factor loading amount for each of the relationship, expertise, role, and performance factors was.05 or higher, and Cronbach's α coefficient was relationship(α=.879), expertise(α=.891), role(α=.914), and performance(α=.943)[21][22][23].

Fourth, the dependent variable was Service Satisfaction, and as a result of factor analysis in the study of Ki-beom Song(2019), the factor loading amount of the Service Satisfaction factor was .05 or more, and the Cronbach's α coefficient was α=.906[24].

As a result of factor analysis to verify the validity of the questionnaire, and Cronbach's α coefficient to verify reliability, the definitions and indicators of Professional Recognition factor, Role Expectation factor, and Service Satisfaction factor are consistent and reliable. However, in this study, the questionnaire items used in previous studies were modified to suit the purpose of this study, and reorganized into a 5-point Likert scale and used.

2.3. Analysis of data

In this study, frequency analysis was performed to find out the general characteristics of survey participants using SPSS Program 25.0, and factor analysis and Cronbach's α coefficient were calculated to verify the validity and reliability of the questionnaire. In addition, correlation analysis was con-

ducted to find out the relationship between variables, and multiple regression analysis was conducted at the level of .05 to find out the influence of the variables.

3. Results

3.1. Validity and reliability of the questionnaire, correlation

In this study, the maximum likelihood method based on the eigenvalue of 1.0 or higher and the orthogonal rotation method based on the loading value of ±0.4 or higher were used to find out the construct validity of the questionnaire. And the reliability of the questionnaire was verified by calculating the Cronbach's α coefficient.

First, as a result of factor analysis and reliability verification for Professional Recognition, the Eigen value and Cronbach's α coefficient of the occupationality factor were 5.359(α=.927), and the ideological factor was 4.147(α=.859). Cum pct was 70.478%.

Second, as a result of factor analysis and reliability verification for Role Expectation, the Eigen value and Cronbach's α coefficient of the relationship factor were 5.824(α=.845), the expertise factor 5.124(α=.802), and the role factor 4.382(α=.837), and the outcome factor was 3.762(α=.765). Cum pct was 55.856%.

Third, as a result of factor analysis and reliability verification for Service Satisfaction, the Eigen value and Cronbach's α coefficient of the Service Satisfaction factor were 9.457(α=.945), and the cum pct was 75.429%.

Fourth, as a result of performing correlation analysis using SPSS, the relationship between all constituent concepts is positive(+), and the direction of the relationship between the variables is consistent. Based on these results, it is shown that it is possible to recognize the influence of variables through regression analysis conducted to verify the research hypothesis of this study.

3.2. The effect of professional perception on role expectation

Table 1. The effect of professional perception on relationships.

Dependent variable / Independent variable	Relationships			
	b	*Std.E*	*β*	*t*
Occupational	.132	.051	.145	2.536**
Ideological	.125	.048	.135	2.051*
R^2	.268			
F	28.543***			

Note: *p<.05, **p<.01, ***p<.001.

<Table 1> it was found that occupational factors(β=.145) and ideological factors(β=.135) of Professional Recognition had a significant effect on the relationship factors, and R^2=.268, which had 26.8% explanatory power.

Table 2. The effect of professional perception on professionalism.

Dependent variable / Independent variable	Professionalism			
	b	*Std.E*	*β*	*t*
occupational	.335	.062	.316	5.135***
ideological	.304	.049	.331	6.012***
R^2	.503			

F	55.729***

Note: ***p<.001.

<Table 2> it was found that occupational factors(β=.316) and ideological factors(β=.331) of Professional Recognition had a significant effect on the professionalism factor, and R^2=.503, which had 50.3% explanatory power.

Table 3. The effect of professional perception on roles.

Dependent variable / Independent variable	Roles			
	b	*Std.E*	*β*	*t*
occupational	.328	.082	.286	3.975***
ideological	.303	.065	.247	3.125**
R^2		.299		
F		42.748***		

Note: **p<.01, ***p<.001.

<Table 3> it was found that occupational factors(β=.286) and ideological factors(β=.247) of Professional Recognition had a significant effect on role factors, and R^2=.299, which had 29.9% explanatory power.

Table 4. The effect of professional perception on performance.

Dependent variable / Independent variable	Performance			
	b	*Std.E*	*β*	*t*
occupational	.315	.063	.328	5.301***
ideological	.306	.045	.305	4.087***
R^2		.337		
F		56.715***		

Note: ***p<.001.

<Table 4> it was found that occupational factors(β=.328) and ideological factors(β=.305) of Professional Recognition had a significant effect on performance factors, and R^2=.337, which had 33.7% explanatory power.

3.3. The effect of professional perception on service satisfaction

Table 5. The effect of professional perception on service satisfaction.

Dependent variable / Independent variable	Service satisfaction			
	b	*Std.E*	*β*	*t*
occupational	.363	.067	.412	4.639***
ideological	.245	.055	.284	3.573**
R^2		.361		
F		57.714***		

Note: *p<.05, ***p<.001.

<Table 5> it was found that occupational factors(β=.412) and ideological factors(β=.284) of Professional Recognition had a significant effect on Service Satisfaction factors with R^2=.361 which had 36.1% explanatory power.

3.4. The effect of role expectation on service satisfaction

Table 6. The effect of Role Expectation on service satisfaction.

Dependent variable / Independent variable	Service satisfaction			
	b	*Std.E*	*β*	*t*
Relationships	.190	.074	.159	2.314**
Professionalism	.321	.062	.324	5.157***
Roles	.313	.049	.316	6.021***
Performance	.224	.078	.168	2.635**
R^2	.389			
F	78.126***			

Note: **p<.01, ***p<.001.

<Table 6> relationship factors of Role Expectation(β=.159), Professionalism factor(β=.324), role factor(β=.316), and performance factor(β=.168) significantly influence Service Satisfaction with R^2=.389. which had 38.9% explanatory power

4. Discussion

Regarding the results of this study that professional perception affects Role Expectation and Service Satisfaction, professional occupation and professional ideology were shown in the majors' major satisfaction, which reflected their importance as professionals based on the general public's perception of their professions[25]. In addition, not only is the problem of perception of service providers important to the profession of service providers, but also the role of service providers as professions is emphasized[26]. In addition, it can be seen that the importance of enhancing professionalism awareness has emerged as there is a relationship between the attractiveness of the leader, recognition of expertise, and quality of service[27].

It was found that the recognition of the profession affects the image and importance of the related field[28]. If various efforts are made to reinforce the characteristics of expertise in the related field, it can contribute effectively to making positive changes related to recognition as a professional[29].

In the case of a professional job, since it is recognized as having excellent ability in the field, expectations for the role are high[30]. In addition to the relationship between service users' expectation disagreement and consultation efficiency for the role of the service provider, Role Expectations are shown to affect immersion and sustainability, which can be interpreted as an important way to meet the needs of service users[31]. Therefore, according to the trend of the times, the high demands of service users for the role of service providers are also related to their professionalism, so Sports Leaders need efforts to hone their expertise and skills in their area and to have a sense of responsibility and mission[32][33].

As such, it can be seen that the results of previous studies and researchers' arguments fully support the results of this study that Professional Recognition affects Role Expectation and Service Satisfaction. In order to do so, they must receive training or education for a considerable period of time and take responsibility accordingly, and must comply with the code of conduct along with an autonomous organizational system[34]. In addition, not only should professionalism become a relationship with customers in a dynamic and constantly changing environment, but also the effort and commitment of learning to upgrade oneself as an expert be emphasized. Moreover, self-directed learning skills to enhance the expertise of Sports Leaders, ability to adapt quickly to ever-changing situations and relationships with customers, and having their own internal standards to constantly learn and reach goals are also important tasks[35].

In the current sports market, competition is intensifying, and new marketing methods are emerging to secure customers, secure corporate competitiveness, and protect the market. In particular, the

professionalism of a sports center leader affects the trust of customers, the image of the company, and the intention of action, and the professionalism of the leader is a bridge between customers and companies(sports centers). It plays a very important role in performance.

In other words, the sports center leader's expertise is the driving force to share knowledge between customers and leaders through interactions with sports facilities and services, and to create new knowledge and values jointly. Therefore, in the sports market, it is very important to improve the professionalism of leaders in order to protect the market from competition with other sports including the same sports.

5. Conclusion

As of 2021, the purpose of the survey was explained to the users of 5 sports facilities in Daegu Metropolitan City by personally visiting the sports centers they are using. A questionnaire survey was conducted using the self-evaluation writing method of 350 people who agreed to write the questionnaire. Among the collected data, 319 questionnaires were taken as valid samples, excluding the data whose responses to the questionnaire were not faithful or part of the survey contents were omitted. Using the SPSS Program 25.0, a frequency analysis was performed to find out the general characteristics of the survey participants, and factor analysis and Cronbach's α coefficient were calculated to verify the validity and reliability of the questionnaire. In addition, correlation analysis was conducted to find out the relationship between variables, and multiple regression analysis was conducted at the .05 level to find out the influence between variables, and the following conclusions were obtained.

First, professional perception affects Role Expectation.

Second, professional perception affects Service Satisfaction.

Third, Role Expectation affects Service Satisfaction.

Therefore, in order for Sports Leaders to be recognized as professionals and provide quality services, they must first clearly recognize that they are professional, acquire professional knowledge for work and cultivate culture, mature personality and high responsibility, ethical awareness, and service. There is a need for continuous efforts that can be trusted by users of facilities and services.

6. References

6.1. Journal articles

[1] Nam SH & Lee JB & Oh JM. Analysis of the Perception of Leaders and Participants for the Value Creation of Sports for All in Urban Society. *International Journal of Human & Disaster*, 5(2), 41-48 (2020). [Article]

[2] Choi JH. Development of Company Athletic Meet Models for Vitalizing Leisure and Sports. *Journal of Sport and Leisure Studies*, 48, 593-600 (2012).

[3] Kim WK. A Study on the Development of Expertise the Instructors to Promote Life Sports. *The Korean Entertainment Industry Association*, 11(6), 153-163 (2017).

[4] Kim SH & Hong SJ & Shin HB. The Structural Relationship among Safety Climate, Motive to Participate, and Leisure Satisfaction Level of Marine Sports Participants. *Kinesiology*, 5(1), 65-73 (2020). [Article]

[5] Goo KB & Choi YS & Jeon YS. Roles of Sports Tourism Resources to Activate Sport for All. *Journal of Sport and Leisure Studies*, 54, 641-650 (2013).

[6] Byeon MK & Park SJ & Choi EY. Effects of a Wonderful Life Program on the Wellbeing Behaviors, Life Satisfaction and Subjective Quality of Life of Community Elderly People in Korea: Wonderful Life Program Includes Safety. *International Journal of Crisis & Safety*, 4(1), 1-7 (2019). [Article]
[8] Lee SC & Sin CS. The Effects of Service Quality on Service Loyalty in Public Sport Centers. *The Korean Journal of Physical Education*, 43(1), 425-433 (2004).
[9] Jang YJ & Kim HD. The Process of Cultural Formation of Sport for All Instructor -Focused on Mind Cultural-. *Journal of the Korean Society for Wellness*, 10(4), 149-158 (2015).
[10] Kim YH & Lee JL & Kwon KN. Study on the Revitalization of National Sports for All Festival. *The Korean Journal of Physical Education*, 55(5), 411-421 (2016).
[11] Ritzer G & Walczak D. The Changing Nature of American Medicine. *Journal of American Culture*, *9*(4), 43-51 (1986).
[12] Saracho ON & Spodek B. Play for Young Handicapped Children in an Integral Setting, Part 2. *Day Care and Early Education*, *15*(3), 31-33 (1988).
[13] Shin HB & Choi HS. Risk Management Plan for Safety of Sport Facilities in Republic of Korea. *International Journal of Crisis & Safety*, 2(2), 9-16 (2017). [Article]
[14] Choi SK. Analysis and Suggestion for Safety When Using Physical Education Facilities in Rural Areas in Korea. *International Journal of Crisis & Safety*, 3(3), 6-9 (2018). [Article]
[15] Wilensky HL. The Professionalization of Everyone?. *American Journal of Sociology*, 70, 137-168 (1964).
[19] Parasuraman A & Zeithml VA & Berry LL. Servqual: A Multiple Item Scale for Marketing Consumer Perceptions of Service Quality. *Journal of Retailing*, 64, 12-24 (1988).
[20] Kang YS & Kam S & Yeh MH. Interns` and Residents` Professional Job Perception and Its Effect to Their Job Satisfaction. *Korean Journal of Preventive Medicine*, 30(1), 209-228 (1997).
[21] Tinsley HE & Workman KR & Kass RA. Factor Analysis of the Domain of Client Expectancies about Counseling. *Journal of Counseling Psychology*, 27, 561-570 (1980).
[22] Keum MJ & Yang MJ. Relation between EAC(Expectation about Counseling) and Locus of Control in Adolescents and Parents. *Korean Psychological Association*, 13(3), 75-94 (2001).
[25] Kwon MY. A Study on the Professionalism, Ideology and Satisfaction in Major Which Recognized by the University Students in the Department of Wedding. *Journal of the Korean Society of Cosmetology*, 22(1), 78-87 (2016).
[26] Chung WJ & Cho CH & Lim YK & Lee HJ. An Attitudinal Study of Medical Profession for Development of Integrated Medical Model for Medical Consumers. *Journal of Social Thoughts and Culture*, 19(1), 267-296 (2016).
[27] Chung MS & Na SK. The Relationship between Professional Recognition and Service Quality of Sports Instructor' Attractiveness. *Korean Journal of Sports Science*, 20(6), 841-854 (2011).
[28] Oh MJ. A Factor Analsis on the Degree of Importance of Professional Nursing for Advancing Nursing Image. *Korean Society of Public Health Nursing*, 14(1), 80-94 (2000).
[29] Oh HY & Kim KY. A Study on the Perception of Professionalism for Librarians in Korean Public Libraries. *Journal of the Korean Society for Information Management*, 32(3), 237-260 (2015).
[30] Cho YK & Jeong JY & Lim EM. Elementary School Homeroom Teachers' Role Expectations and Evaluation about the School Counselors in Jeonbuk. *The Journal of Korean Teacher Education*, 35(3), 315-337 (2018).
[31] Kim JA. The Secretary Majors' Cognition and Expectations on the Role and Qualities of the Secretary. *Journal of Secretarial Studies*, 21(3), 5-27 (2012).
[32] Ahn IH & Her WK. The Relationship between Client's Expectation Discrepancy about Group Counselor's Role and Counseling. *The Korean Journal of Counseling*, 4(4), 713-725 (2003).
[33] Park SI. The Relationship between Role Expectation and Sports Flow, Exercise Adherence Intention among Physical Education Calss Participant's. *Journal of the Korean Society for Wellness*, 12(3), 387-397 (2017).
[35] Lee KA & Kim KH. A Study on Validation of Lifelong Learning Programmer's Professionalism Factors and Exploration of Related Variables. *Journal of Lifelong Education*, 12(2), 91-119 (2006).

6.2. Thesis degree

[7] Kim YS. A Study of Developing the LPCT(Leisure Participation Condition Type) for Leisure Participation based on Leisure Constraints and Facilitators. Hanyang University, Master's Thesis (2009).
[23] Lim HR. Relationship between Role Expectations and Job Stress of Youth Counselors. Ajou University, Master's Thesis (2016).
[24] Song KB. A Study of Effects of a Social Welfare Service Delivery System of a Local Government on Service Satisfaction and Quality of Life of the Elderly. Hoseo University, Doctoral Thesis (2016).

6.3. Books

[16] Barker RL. The Social Work Dictionary. Silver Spring (1987).
[17] Brookover WB & Gottleb D. A Sociology of Education. American Book (1964).
[18] Newcomb TM & Turner RH & Converse PE. Social Psychology. Holt Rinehart and Winston (1965).
[34] Goldman H. Politics, Death, and the Devil: Self and Power in Max Weber and Thomas Mann. University of California (1992).

7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Lead Author	HC	-Set of concepts☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑ -Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑
Corresponding Author*	JI	

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Consideration of GREENAREARATIO When Establishing an Urban Development Plan

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Abstract

Purpose: *Just as the natural environment is vital for people to live in, the park and green area, which are indicators for eco-friendly development, are essential when proceeding with urban development projects. Therefore, this study reviewed focusing on the park and green area ratio in the environmental impact assessment for urban development projects. Through this, we intended to provide a comprehensive guideline for environmental land use planning and design for urban development or residential land development projects and to guide plans and designs based on this.*

Method: *The analysis was based on the environmental impact assessment, which was investigated for 145 urban development projects for 18 years from 2003 to 2020. We conducted a one-way ANOVA analysis to determine the difference between the green area rate by year, the green area rate by region, the population density by region, and the park area per person by region. Post-hoc analysis was performed by the Scheffe test. To conduct the above statistical analysis, we used the Spss Statistics 21 statistics program.*

Results: *The number of consultations on environmental impact assessment for urban development projects by year was the highest in 2006 and 2008, with 14 cases(9.66%). The green area rate by year was as high as 25.09% in 2005, 24.88% in 2007, and 22.73% in 2009. The green area rate by region was the highest in the Gangwon area with 22.63%, followed by 20.47% in the metropolitan area, 19.59% in the Honam area, and 19.51% in the Chungcheong area. The population density by region was the highest with 2.10(person/m^2) in the metropolitan area. Next the Gangwon area was 1.99(person/m^2) and the Southeast area was 1.80(person/m^2). The park area per person by region was the largest in the Honam area, with 10.93m^2.*

Conclusion: *The area of parks and green spaces is seen as the minimum standard stipulated by law. However, the high green area ratio and the difference in population density by region during active urban development projects are to create a pleasant residential environment. Therefore, in a place with high population density, it is necessary to establish a high standard for securing green space to create a comfortable living environment. Also, in the case of parks, the location is essential as well as the area. Since green areas on slopes excluding parks in the green area ratio are difficult to use, we insist that green areas on slopes should be reduced, and park areas should be set high to create a pleasant residential environment.*

[Keywords] ***Urban Development Plan, Urban Development Projects, Parks, Green Areas, Green Area Ratio***

1. Introduction

In the 2000s, the necessity of urban development projects was raised in Korea due to a lack of housing. Laws related to economic development were enforced, such as the Housing Site

Development Promotion Act, the Special Act on the Construction of Bogeumjari Housing, and the Special Act on the Construction and Support of Innovation Cities by Relocation of Public Institutions to Provincial Areas[1][2]. Urban development projects were carried out along with steady economic growth. On the other hand, damage to natural ecosystems such as forests and farmland is increasing due to intensive land use following economic development[2].

Traditionally, land use status in urban planning, landscape design, and civil engineering design has considered economic efficiency rather than considering the surrounding environment and circumstances. The main content was to establish a plan to consider the efficiency of engineering works such as land compartment rearrangement for road and housing construction and concern economic efficiency of land price reflection[3]. However, with the emergence of the recent environmental paradigm, the environment has played an important role in pursuing the quality of life due to residents' changing perceptions with arguments that sustainable development and environmental planning should be applied to land use planning and design[2][4][5]. Environmental impact assessment plays a significant role in systematically promoting and establishing land use plans and designs to consider the environment[2][6][7].

Lee DG, Sung HC, and Yoon SW(1998, The Korean Institute of Landscape Architecture) say that the index of green area per capita becomes a very expected indicator when demand quantity is determined in direct relation to people, such as recreational demand. However, they also say that since the indicator uniformly sets the quantitative standard of green space, it does not take into account the city's urban form, natural conditions, and the living standards of land-using citizens[8]. Besides, they argue that it is not advisable to use the criterion of 'green area per capita' or 'a few percent of the area of the planned area' before the law is implemented. They present the necessity of setting a standard for a comprehensive park and green area[2][8][9]. Land use plans for urban development projects can be affected by several factors. They may change according to the demands of end-users, or various government policies may influence them[10][11]. However, when urban development projects are in progress, the park and green space plans do not change easily without substantial influence because they are related to economic feasibility and government policy[12][13]. Due to the low population density and high green area ratio, selling price has risen, ultimately putting a burden on consumers. As a result, projects are carried out in forests and farmlands where land prices are relatively low, becoming an important issue when discussing environmental impact assessments. If this trend continues, it is pointed out that there is a high possibility of damaging the forest, such as the lifting of restricted development zones to supply the planned housing[2][14]. Just as the natural environment is vital for people to live in, parks and green areas, which are indicators for eco-friendly development, are essential in urban development projects[2][15][16].

Therefore, when conducting the environmental impact assessment for urban development projects, we intend to provide comprehensive guidelines for environmental land use planning and design for urban development or housing site development projects by reviewing parks and green area rates. This study attempted to induce planning and design based on them.

2. Methods

2.1. Gathering data

The subject of this study was 145 environmental impact assessment projects for urban development that business operators applied for consultation with consultative agencies from 2003 to 2020 when the need for urban development projects began to be raised due to housing shortages. We extracted and investigated the data from the environmental impact assessment report for urban development projects in the environmental impact assessment support system(www.eiass.go.kr)[17] <Table 1>, <Figure 1>.

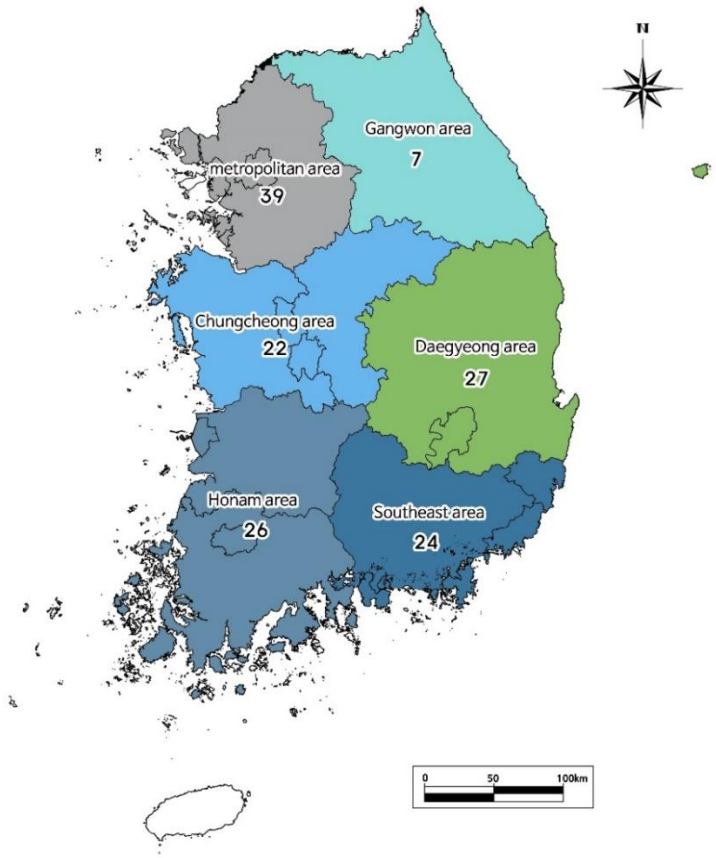
The number of consultations on urban development projects by region was the highest in the metropolitan area with 39 cases(26.9%). There were 27 cases(18.6%) in the Daekyung area, 26 cases(17.9%) in the Honam area, 24 cases(16.6%) in the Southeast area, 22 cases(15.2%) in the Chungcheong area, and 7 cases(4.8%) in the Gangwon area.

Table 1. Number of research target area.

Target index / Institution in consultation	Number	Ratio
Metropolitan area	39	26.9
Gangwon area	7	4.8
Chungcheong area	22	15.2
Daegyeong area	27	18.6
Honam area	26	17.9
Southeast area	24	16.6
Total	145	100

Note: Metropolitan area(Seoul, Incheon, Gyeonggi), Gangwon area(Gangwon), Chungcheong area(Chungbuk, Chungnam, Sejong, Daejeon), Daegyeong area(Gyeongbuk, Daegu), Honam area(Jeonbuk, Gwangju, Jeonnam), Southeast area(Ulsan, Gyeongnam, Busan).

Figure 1. Number of jurisdictions and studies.



Note: National geographic information institute, 1/25000 index,researcher rewriting.

2.2. Data analysis

We analyzed this study based on the evaluation data on 145 cases for 18 years from 2003 to 2020, which were surveyed during the environmental impact assessment for urban development projects.

Consultation institutions by city and province across the country were classified and analyzed by region. The green area ratio was analyzed by classifying the ratio of green area to the total area such as parks, sloped green areas, and buffer green areas among the total urban development area by region. The population density is the ratio of the planned population divided by the total development area, and it was classified and analyzed by region. The park area per person is the value obtained by dividing the park area by the planned population, and it was classified and analyzed by region. In this study, we conducted a One-way ANOVA analysis to analyze the difference between the green area rate by year, the green area rate by region, the population density by region, and the park area per person by region. Post-hoc analysis was performedby the Scheffe test. To perform the above statistical analysis, we used the Spss Statistics 21 statistics program.

3. Results & Discussion

3.1. Analysis of green area rate by year

The results of one-way ANOVA analysis to find out the difference in the green area rate by year are shown in <Table 2>. As a result of checking the F value and the significance probability for the green area rate, it was found that F=2.305, p=0.04. There was a difference in green area rates by year.

Table 2. Variance analysis of green area rate by year.

One-way ANOVA analysis

Division	Sum of squares	df	Mean square	F	Significance probability
Between - group	1976.421	17	116.260	2.305	.004**
Within - group	6405.467	127	50.437		
Total	8381.888	144			

Note: *p<.05, **p<.01,***p<.001.

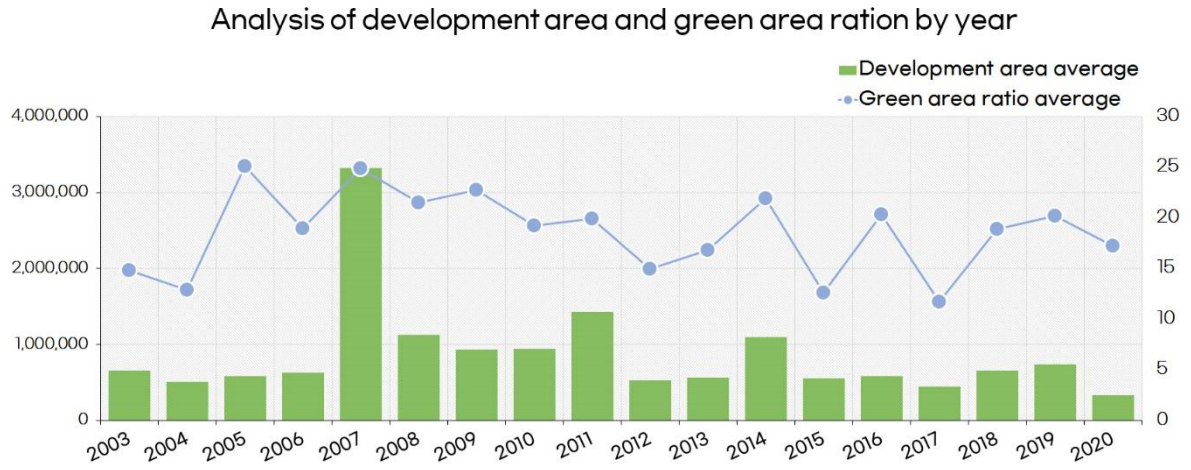
The number of consultations on urban development projects by year was the highest with 14 cases(9.66%) each in 2006 and 2008 and the lowest with 3 cases(2.07%) in 2004. We analyzed that the number of consultations on urban development projects was raised from 2005 to 2010 after the necessity of urban development projects due to lack of residential land in the early 2000s. After 2010, it is shown at a similar level every year.

The results of analyzing the green area ratio by year are shown in <Table 3> and <Figure 2>. It was the highest at 25.09% in 2005.It was 24.88% in 2007, 22.73% in 2009, and the lowest at 11.71% in 2017. We interpreted that environmental impact assessment consultations were conducted with the green area ratio higher than the legal standard between 2005 and 2010 when many consultations were performed on urban development projects[18][19].

Table 3. Analysis of green area rate by year.

Year	N	Development area average	Green area average	Standard deviation	Year	N	Development area average	Green area average	Standard deviation
2003	4	657,209	14.79	7.3438	2012	4	524,658	14.94	2.3978
2004	3	505,346	12.87	4.5497	2013	8	567,338	16.81	4.8371
2005	10	577,569	25.09	10.1275	2014	9	1,098,018	21.91	6.1263
2006	14	626,823	18.94	8.1430	2015	7	552,876	12.61	2.8629
2007	9	3,320,982	24.88	4.3255	2016	8	583,540	20.31	5.7309
2008	14	1,122,217	21.54	8.7434	2017	7	444,356	11.71	2.8965
2009	12	935,259	22.73	7.1974	2018	8	653,671	18.87	9.5260
2010	9	939,775	19.22	8.5336	2019	8	734,715	20.20	4.8014
2011	5	1,430,008	19.92	9.7272	2020	6	337,140	17.21	5.2060
Total	145	913,279	19.48	7.6294					

Figure 2. Analysis of green area rate by year graph.



3.2. Analysis of green area rate by region

<Table 4> shows the results of one-way ANOVA analysis to determine the difference in the green area rate by region. As a result of checking the F value and the significance probability for the green area ratio, F=0.780, p=0.566 were found. There was no difference in the green area rate by region.

Table 4. Variance analysis of green area rate by region.

One-way ANOVA analysis					
Division	Sum of squares	df	Mean square	F	Significance probability
Between - group	228.740	5	45.748	.780	.566
Within - group	8153.148	139	58.656		
Total	8381.888	144			

Note: *p<.05, **p<.01, ***p<.001.

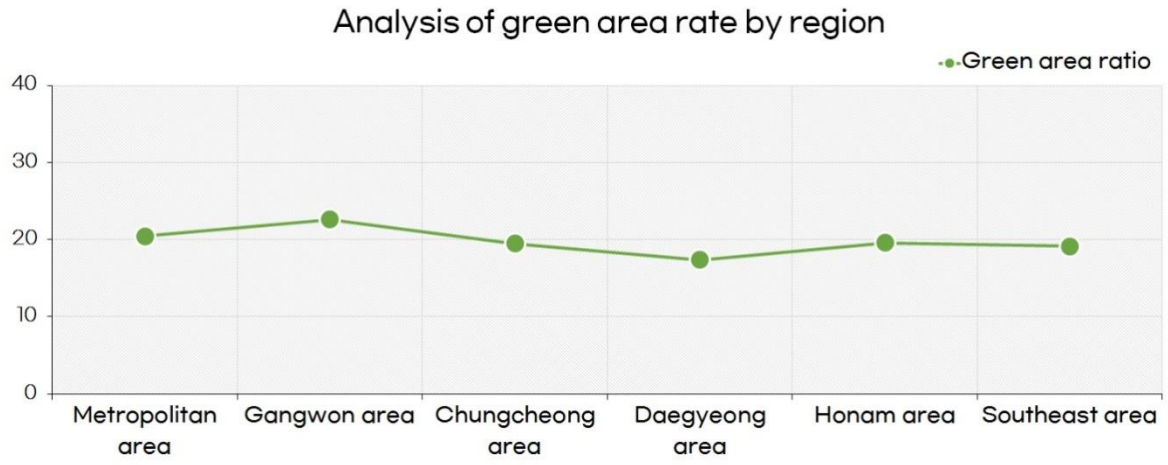
The green area rate by region was the highest in the Gangwon area with an average of 22.63%(7 cases). Next, the metropolitan area averages 20.47%(39 cases), the Honam area averages 19.59%(26 cases), the Chungcheong area averages 19.51%(22 cases), the Southeast area averages 19.16%(24 cases), and the Daegyeong area averages 17.39%(27 cases).

The results of analyzing the green area ratio by region are shown in <Table 5> and <Figure 3>.

Table 5. Analysis of green area rate by region.

Area	N	Average	Standard deviation
Metropolitan area	39	20.47	6.7608
Gangwon area	7	22.63	6.8133
Chungcheong area	22	19.51	7.0860
Daegyeong area	27	17.39	8.6588
Honam area	26	19.59	7.9162
Southeast area	24	19.16	8.2548
Total	145	19.48	7.6294

Figure 3. Analysis of green area rate by region graph.



3.3. Analysis of population density by region

<Table 6> shows the results of one-way ANOVA analysis to determine the difference in population density by region. The result of confirming the F value and the significance probability for the population density by region was F=3.754, p=0.003. There were differences in population density by region.

Table 6. Variance analysis of population density by region.

One-way ANOVA analysis					
Division	Sum of squares	df	Mean square	F	Significance probability
Between - group	9.287	5	1.857	3.754	.003**
Within - group	68.772	139	.495		
Total	78.058	144			

Note: *p<.05, **p<.01, ***p<.001.

We analyzed the population density as planned population ÷ project area × 100.

The population density by region was the highest in the metropolitan area, with an average of 2.10(39 cases). Gangwon area averaged 1.99(7 cases), Southeast area averaged 1.80(24 cases), Daekyung area averaged 1.62(27 cases), Honam area averaged 1.61(26 cases).

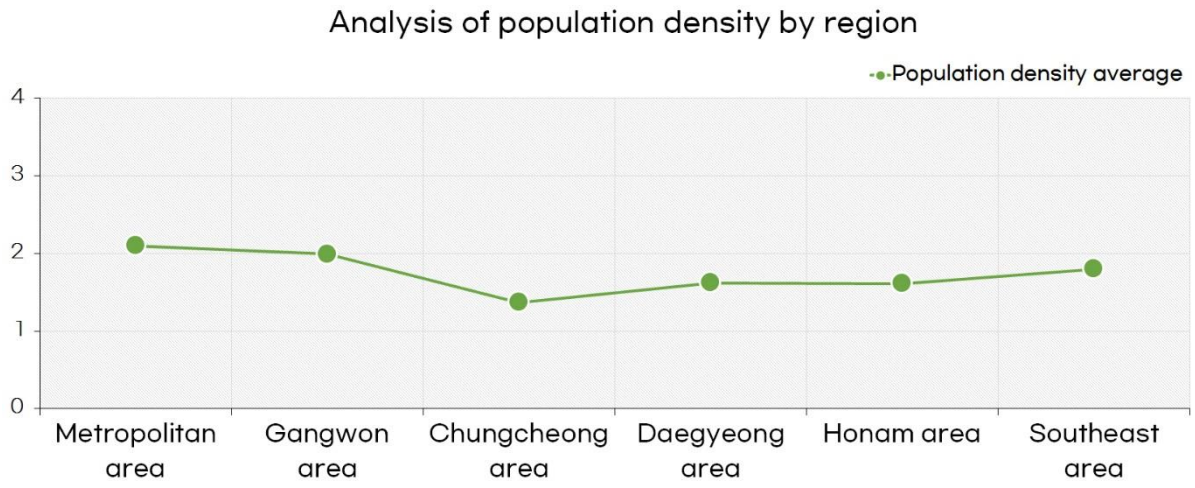
Chungcheong area had the lowest average of 1.37(22 cases).

The results of analyzing the population density by region are shown in <Table 7> and <Figure 4>. The reason why the population density was highest in the metropolitan area is considered to be that the planned population was set high due to overcrowding in Seoul and Gyeonggi-do[20].

Table 7. Analysis of population density by region.

Area	N	Park area per person	Standard deviation
Metropolitan area	39	6.65	4.0708
Gangwon area	7	6.85	3.4552
Chungcheong area	22	8.78	6.5189
Daegyeong area	27	7.44	8.5458
Honam area	26	10.93	15.2632
Southeast area	24	6.06	6.2292
Total	145	7.80	8.5873

Figure 4. Analysis of population density by region graph.



3.4. Analysis of park area per person by region

<Table 8> shows the results of one-way ANOVA analysis to determine the difference in park area per person by region. The result of checking the F value and the significance probability for the park area per person was F=1.115, p=0.355. There was no difference in the park area per person by region.

Table 8. Variance analysis of park area per person by region.

One-way ANOVA analysis

Division	Sum of squares	df	Mean square	F	Significance probability
Between - group	409.517	5	81.903	1.115	.355
Within - group	10209.168	139	73.447		
Total	10618.686	144			

Note: *p<.05, **p<.01, ***p<.001.

Park area per person was analyzed as park area ÷ planned population.

As a result of analyzing the park area per person by region, the Honam area was the largest, with an average of 10.93(26 cases).

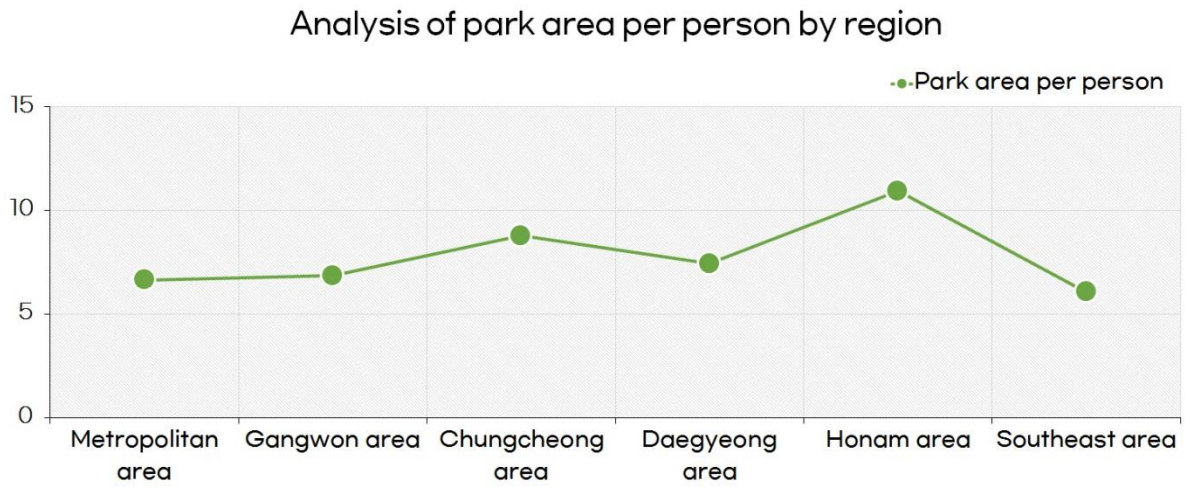
Chungcheong area averaged 8.78(22 cases), Daegyeong area averaged 7.44(27 cases), Gangwon area averaged 6.85(7 cases), Metropolitan area averaged 6.65(39 cases). The Southeast area was the least, with an average of 6.06(24 cases).

The results of analyzing the park area per person by region are shown in <Table 9> and <Figure 5>. As for the park area per person, the southeast and metropolitan areas were the least. The park area, an essential indicator of a pleasant residential environment, should be set high in the metropolitan area and overcrowded areas with high population density to create a comfortable residential environment[21][22][23].

Table 9. Analysis of park area per person by region.

Region	N	Park area per person	Standard deviation
Metropolitan area	39	6.65	4.0708
Gangwon area	7	6.85	3.4552
Chungcheong area	22	8.78	6.5189
Daegyeong area	27	7.44	8.5458
Honam area	26	10.93	15.2632
Southeast area	24	6.06	6.2292
Total	145	7.80	8.5873

Figure 5. Analysis of park area per person by region graph.



4. Conclusion

Land use plans for urban development projects can be affected by several factors. They may be changed according to the demands of the times of end-users, or they may be affected by various government policies. However, when urban development projects are in progress, park and green area plans do not change easily without substantial influence because they are related to economic feasibility and government policies. Due to the low population density and effect of high green area ratio, the selling price rises, which ultimately burdens consumers. As a result, the project is being carried out in forests or farmland where the land price is relatively low, which is an important issue when discussing environmental impact assessment. If this trend continues, experts point out that there is a high possibility of damaging the forest, such as lifting restricted development zones to supply the planned housing. Just as the natural environment is vital for people to live in, parks and green areas, which are indicators for eco-friendly development, are essential when urban development projects are underway.

This study analyzed the environmental impact assessment results of 145 urban development projects for 18 years from 2003 to 2020. It then analyzed the green area rate by year,

the green area rate by region, population density by region, and park area per person by region. We tried to induce eco-friendly planning and design in urban development projects.

The summary of this study is as follows.

First, the number of consultations on environmental impact assessment for urban development projects by year was the highest in 2006 and 2008 with 14 cases(9.66%), and the lowest with 3 cases in 2004(2.07%). In the early 2000s, after the necessity of urban development projects was raised due to lack of residential land, the number of consultations on urban development projects from 2005 to 2010 can be seen largely. After 2010, it is shown at a similar level every year.

Second, the green area ratio by year was 25.09% in 2005, 24.88% in 2007, and 22.73% in 2009. It was the lowest at 11.71% in 2017. It can be interpreted that between 2005 and 2010 when there were many consultations on urban development projects, the green area ratio was also planned to be higher than the legal standard, and the environmental impact assessment consultation was conducted.

Third, the green area rate by region was the highest in the Gangwon area with an average of 22.63%(7 cases). Next, the metropolitan area averaged 20.47%(39 cases), the Honam area averaged 19.59%(26 cases), the Chungcheong area averaged 19.51%(22 cases), the Southeast area averaged 19.16% (24 cases), and the Daegyeong area averaged 17.39%(27 cases).

Fourth, the population density by region was the highest in the metropolitan area with an average of 2.10(39 cases). Gangwon area averaged 1.99(7 cases), Southeast area averaged 1.80(24 cases), Daekyung area averaged 1.62(27 cases), Honam area averaged 1.61(26 cases). Chungcheong area had the lowest average of 1.37(22 cases). The reason why the population density was highest in the metropolitan area is considered to be that the planned population was set high due to overcrowding in Seoul and Gyeonggi-do.

Fifth, As a result of analyzing the park area per person by region, the Honam area was the largest, with an average of 10.93(26 cases).

Chungcheong area averaged 8.78(22 cases), Daegyeong area averaged 7.44(27 cases), Gangwon area averaged 6.85(7 cases), Metropolitan area averaged 6.65(39 cases). The Southeast area was the least, with an average of 6.06(24 cases).

In summarizing the results of this study, the area of parks and green spaces is seen as the minimum standard stipulated by law. However, the high green area ratio and the difference in population density by region during active urban development projects are to create a pleasant residential environment. Therefore, in a place with high population density, it is necessary to establish a high standard for securing green space to create a comfortable living environment. Also, in the case of parks, the location is essential as well as the area. Since green areas on slopes excluding parks in the green area ratio are difficult to use, we insist that green areas on slopes should be reduced, and park areas should be set high to create a pleasant residential environment.

5. References

5.1. Journal articles

[1] Kim EJ & Yuh HK. A Study on the Change of the Land Use Component in Public Housing Complexes by the Influence of the Changes in Environmental Policy. *Journal of Korea Planning Association*, 44(5), 235-253 (2009).

[3] Kim EJ & Yuh HK. A Study on the Factor of Environment Impact Assessment having Influence on Park & Green Open Space Planning of Public Housing Complexes. *Journal of Korea Planning Association*, 45(3), 105-121 (2010).

[4] Choi JG & Seo SC & Joo YJ. Research on Improving EIA Through Causality Analysis. *Journal of Environmental Impact Assessment*, 17(1), 11-24 (2008).

[5] Son YH & Yoon MY. Types of Green Landscapes in a Suburban City Perceptions of Local Residents. *Journal of the Korean Institute of Landscape Architecture*, 39(5), 101-110 (2011).
[6] Jeong YM. A Study on the Systematization of the Legal Framework for Environmental Impact Assessment Systems. *Journal of Environmental Impact Assessment*, 13(3), 195-209 (2001).
[7] Hong SP. A Study on the Implication of Sustainability and Environmental Assessment. *Journal of Environmental Impact Assessment*, 20(3), 269-279 (2011).
[8] Lee DK & Sung HC & Youn SW. A Study on the Method for Establishment of Quantitative Target of the Urban Greenspace -In the Case of Suwon City. *Journal of the Korean Institute of Landscape Architecture*, 25(4), 158-170 (1998).
[9] Oh SR & Kang SH & Lee CW. A Study on the Environmental Assessment for Regional-based Green Area Conservation. *Journal of Korean Society of Water and Wastewater*, 25(4), 535-546 (2011).
[10] Kang SY. Environmental Impact Assessment Policy in Korea. *Journal of Environmental Impact Assessment*, 6(2), 29-33 (1997).
[11] Song IS & Kim SJ & Kim CR. A Study on Creation and Activation of Green Areas in Underground Spaces of Seoul. *Seoul Development Institute*, 51, 1-142 (2010).
[12] Paik JW & Chung KW. A Study on Green Design for Improving Green Ratio in Urban Environment. *Journal of the Korean Society Design Culture*, 17(1), 215-225 (2011).
[13] Lee J & Kwon G & Cheon W & Lim W. A Study on the Revitalization of Forest Management by Improving the Implementation Rate of Forest Projects. *International Journal of Human & Disaster*, 5(2), 1-9 (2020). [Article]
[14] Song BG & Park KH. An Analysis of Rational Green Area Ratio by Land Use Types for Mitigating Heat-island Effects. *Journal of the Korean Association of Geographic Information Studies*, 18(2), 59-74 (2015).
[15] Kim BW & Lee WA & Park SN. Situations and Problems of Park and Green Space Master Plan based on the Revised Urban Park Law in Korea. *Journal of the Korea Society of Plant and Environmental Design*, 4(3), 1-5 (2008).
[16] Kim C & Lee H & Lim W. Improvement Plan Through Nonagreement Consultation Analysis of Small Scale Environmental Impact Assessment. *Public Value*, 6(1), 1-13 (2021). [Article]
[18] Kim SO & Lee SD. Study on the Ratio of Greenness in Residential Complex Development in the Process of Prior Environmental Review System. *Journal of Environmental Impact Assessment*, 16(5), 311-318 (2007).
[19] Hong J & Lee H & Cheon W & Lim W. An Investigation on the Differences of Management in Landscape Construction Projects. *Public Value*, 5(2), 32-38 (2020). [Article]
[20] Park CI. A Study on Expansion of Urban Park and Green Belt based on Residents' Attitude of Park and Green Belt. *Journal of the Korean Institute of Forest Recreation*, 14(3), 29-37 (2010).
[21] Kim JW. A Study about Expansion of Green Space in Gyongju. *Nonin Group for Regional Development*, 7, 93-118 (2006).
[22] Jeon MJ & Park JS & Lim WH. An Investigation on Developing the Shelter and Safety Facilities of Forest Kindergartens. *International Journal of Protection, Security & Investigation*, 5(1), 42-53 (2020). [Article]
[23] Kwon GS & Cheon WK & Lim WH. A Study on the Actual Condition and Improvement Plan of Hierarchical Safety Management in Natural Parks. *International Journal of Crisis & Safety*, 5(1), 21-34 (2020). [Article]

5.2. Thesis degree

[2] Kim CJ. A Study on Application of Percentage of Park Green-space in Urban Development Projects: For Case-study of Environmental Assessment. Daegu Haany University, Master's Thesis (2013).

5.3. Additional references

[17] https://www.eiass.go.kr/ (2021).

6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	CK	-Set of concepts☑ -Design ☑ -Getting results ☑ -Analysis ☑
Corresponding Author*	HL	-Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Co-Author	WL	-Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑

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The Second to Fourth FINGER Length Ratio(2D:4D) and Its Relationship with Body Composition Parameters in Korean Young Adults

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Abstract

Purpose: *Body composition status is influenced by changes in sex hormones, and this status is also closely related to normal daily life and the risk of various chronic diseases. On the other hand, the relative length of the second and fourth fingers(2D:4D ratio) has been proposed as a marker of prenatal androgen action of sensitivity to testosterone, with a lower 2D:4D being associated with high androgen exposure.In this study, it was examined the relationship between the 2D:4D ratio and various body composition parameters measured by bioelectric impedance analysis(BIA) in young adults to determine the usability of the 2D:4D ratio as a predictor of finger length- related diseases.*

Method: *Ninety-three healthy individuals(60 men and 33 women, age 17-19 years) participated. Subjects' body weight and height were measured, and body mass index(BMI) was calculated. Body fat mass, % body fat, % abdominal fat, skeletal mass, % muscle mass, and % bone mineral density was measured using BIA. SMI(skeletal muscle index) was calculated. The lengths of the second and fourth fingers of the right and left hands were measured using a electronic digital caliper, and the 2D:4D ratio and difference of the digit ratio between the right and left hands(Dr-l) were also calculated. The differences in anthropometric and body composition variables between males and females was analyzed using independent t-test. Pearson's correlation coefficient was used to determine the relationship between finger length measures(the 2D:4D ratio and Dr-l) and body composition parameters. The significance level was considered as $p \leq 0.05$ at all stages.*

Results: *In this study, significant sexually dimorphic differences were found in all results of the anthropometric measures and body composition parameters, excluding Dr-l and % abdominal fat. The height and weight of men were significantly higher than that of women, and the variable related to fat-free mass of men among body composition was significantly higher than that of women. On the other hand, women were significantly higher than men in variables related to body fat mass. As the main findings about the correlation results between the finger length measures and the body composition parameters, there was a significant difference in the 2D:4D ratio between males and females, but all variables except male muscle mass were not significantly correlated with finger length measures.*

Conclusion: *Although the 2D:4D ratio has been proposed as a marker of prenatal androgen action and of sensitivity to testosterone, these results found in this study suggest that finger length measures may not be a preventive indicator for predicting body composition differences and diseases associated with sex hormones and finger length parameters.*

[Keywords] ***Protection, Aging, Androgen, Disease, Finger Length Ratio***

1. Introduction

Body composition is used to describe the percentages of fat, bone, water, and muscle in human body, and this body composition can be divided into two components, fat-free mass(FFM) and body fat(FM). FFM is the weight of all body components except fat and is pri-

marily made up of the skeletal muscles, including minerals, protein, connective tissue, body water, and teeth, as well as organ. Among them, skeletal muscles are very important because they provide the force for locomotion and breathing including heat production. In addition, bone is a mineralized connective tissue made up of four different types of bone cells that provide support for the body, produce blood cells, store minerals, and protect the vital organs[1][2][3][4]. As skeletal muscle and bone are active metabolic tissues that share different pathophysiological pathways, especially various movements are produced though joints whenthe forces generated by the skeletal muscle are transmitted to the bone[5]. However, decline in muscle mass can occur by muscle atrophy caused by insufficient physical activity for a long period of time at all ages or sarcopenia, which is highly related to age. Since muscle force has a positive relationship with muscle mass, the decline in muscle mass can lead to muscle weakness associated withthe risk of adverse outcomes such as physical disability, poor quality of life, and death[6][7]. Along with this, osteoporosis, one of the main and widespread health problems in the world, is a systemic skeletal disorder condition in which bones become weak and brittle, and various factors such as gender, age, physical activity, smoking, alcohol consumption, calcium and vitamin D intake, and hormone levels are known to affect osteoporosis[8].

Secondly, FM refers to the weight of all fat found in the body, and the fat that is essential to overall health is called essential fat, and the fat that is not necessary for essential functions is called non-essential fat. Essential fats are distributed in bones, organs, central nervous system, and muscles, and they protect internal organs, regulate important body hormones, and function as nerve cell insulators and cell membranes. However, the main function of non-essential fat is to store extra energy in the form of lipids. As is well known, excessive accumulation of non-essential fats can lead to obesity, which increases the risk of several chronic diseases such as insulin resistance, hypertension, heart disease and cancer[9][10][11][12][13]. Therefore, healthy management of body composition, such as maintaining proper body fat and high level of skeletal muscle and bone health, is closely related to a high level of quality of life such as performing normal daily life and reducing the risk of various chronic diseases[14][15][16].In general, precise measurements of body composition such as muscle mass and bone density can be measured relatively accurately through several instruments such asmagnetic resonance imaging(MIR), computerized tomography(CT), or dual-energy x-ray absorptiometry(DEXA). However, these measurements for body composition measurement are expensive and pose risks such as radiation exposure. On the other hand, as a non-invasive method of measuring body composition, BIA is knownas an inexpensive and useful method for measuring FFM and FM related parameters[17].

The clinical relationship between body composition and androgens is well documented. Although the effect of testosterone on muscles is influenced by a number of other factors including genetic background, nutrition and exercise[18], testosterone increases muscle protein synthesis. Bhasin et al.(1996)[19] and Storer et al.(2008)[20] reported that testosterone supplementation has dose-dependent effects on muscle size and muscle function, and Bhasin et al.(1997) also reported that androgen deficiency leads to significant muscle loss and weakness[21]. In particular, the loss of muscle mass and muscle strength due to reduced testosterone levels is significant in older adults, and studies by Feldman et al.(2002)[22] and Morley & Perry(2003)[23] show that levels of testosterone decrease year after year with the loss of muscle mass and muscle strength in older adults.In addition, Tagliaferri et al.(2015) reported a study related to the selective reduction of type II muscle fiber atrophy and suggested decreased serum estrogen, IGF1, increase in pro-inflammatory cytokines, and possible changes of genes in common as related factors[24]. Furthermore, impaired steroid production orlow androgen sensitivity could interfere with normal bonedevelopment as well as muscle and closure of the epiphyseal growth plates at theend of puberty. Regarding the relationship between androgen exposure and body fat distribution, Abbott, Dumesic, & Franks(2002) pro-

posed that fetal androgen exposure may be related to adult anthropometric measures, especially abdominal adiposity[25].

Meanwhile, alot of research has been done on the 2D:4D ratio in humans, and it has been widely accepted that the ratio of fingers, especially the second to the fourth, is determined by the influence of prenatal sex hormones as early as the end of the first trimester, and then remains the same during the growth period of an individual[26]. For this reason, it has been suggested that as an indicator of fetal androgen exposure, the 2D:4D ratio is negatively associated to the fetal testosterone(lower 2D:4D ratio) and positively related to embryoid estrogen(higher 2D:4D ratio)[27][28]. In fact, men generally tend to have a lower 2D:4D ratio than women[29][30]. Also, it was reported that right 2D:4D ratio showed stronger relationship with testosterone, estrogen, and sperm numbers then did left 2D:4D ratio[30]. Since the association between prenatal sex hormone exposure and the 2D:4D ratio was found about a century ago[31], various studies have been studied, most of which are focused on the relationship between the 2D:4D ratio and physical/psychological conditions, general health, fertility, some disease, and physical performance[32][33]. As above, some physical characteristics such as body size and shape are known to be affected by fetal sex hormone,but very few studies evaluated the association between the 2D:4D ratio and body composition, which is highly related to body function and health status.Thus, the results of comparing the relationship between body composition components measured by BIA as an economical method for measuring body composition and the finger length ratio in young adults could be an useful preventive indicator for tracking and predicting of various diseases related tosex hormones and finger length. In addition, most of the relevant research has been done on Western population, and studies on Asians such as Korean, whose obesity population is rapidly increasing in recent years, are very scarce. Therefore, the present study examined the relationships between the 2D:4D ratio and the body composition in young male and female university students.

2. Method

2.1. Subjects

A total of 93 healthy university students(men=60, women = 33) who were habitually active in various activities participated in this study. All subjects were freshmen students, and the average age of male and female students were 18.4 years(SD=0.74) and 18.3 years(SD=0.47), respectively. They were recruited through word of mouth and advertising using the university's CTL(center of teaching and learning) system, and participation in this study was voluntary. Prior to participating, the study purpose, procedures, and risks was provided to all subjects, and written informed consent was obtained from all subjects. This study was conducted in compliance with the guidelines related to research ethics.

2.2. Experimental procedures

Data were collected at the beginning of the first semester(March). Height, weight, and body composition were measured to achieve the purpose of this study, and all measurements were conducted by trained research assistant. All anthropometric and body composition measurements were performed in the morning(08:00-11:00) after a minimum 8 hours overnight fast(in the case of water, allowed to drink ad libitum). Subjects were asked to refrain from high intensity exercise, alcohol and caffeine containing beverages for 24 hours prior to the measurements. All measurements were performed after the subject arrived at the laboratory and rested for about 5 minutes. In the order of measurement, height was measured first, followed by weight and body composition.

1) Height, weight, body composition

The subject's height was measured to 0.1 cm using a portable stadiometer(Donghwa Science, South Korea) consisting of an anthropometric measuring instrument with a simple headboard.Inbody 502(Biospace Co, Korea) was used to measure body weight and body composition. The measurement was conducted according to manufacturer instructions, and were measured on the barefoot, wearing minimal clothing(T-shirt and trousers) and with all metallic objects removed. The detailed measurement process is as follows. First, the subject stepped on the foot electrodes with barefoot and stood still until body weight was measured. Following the instructions provided by Inbody 502 after the weight was measured, the subject grasped the hand electrode cables and gently held on the thumb electrode and the palm electrode. Until the body composition measurement was completed, hands were held about 15 degrees away from the body. The inbuilt software was used to calculate other body composition values, including body fat mass, % body fat, % abdominal fat, skeletal muscle mass, % skeletal muscle, and % BMD. In addition, using analyzed data, BMI(body mass index) was calculated by dividing body weight(kg) by height squared(m^2), and SMI was calculated by dividing absolute skeletal muscle mass(kg) by height squared(m^2)[34][35].

2) Measurement of 2D:4D ratio

A electronic digital caliper(Wanhanda, China) was used to measure finger lengths. Finger lengths was measured according to the method presented by Manning et al.(1998), and the second and forth digits of both hands were measured[30]. The subjects were asked to take off any ornaments such as jewelry or rings that would interfere with digit length measurements. To measure digit lengths, the subjects were asked to place their forearm on the table with the palm facing upward with their fingers straight in the same plane. Lengths of the second and fourth digit were measured from the center of the digit crease proximal to the palm to the tip of the finger. Finger length was measured to the nearest 0.01 mm, and the average correlation between first and second measurements showed strong correlation(r=0.995, $P< 0.001$). The average value of each finger length was used in analysis, and 2D:4D ratio was calculated by dividing the second digit length by the fourth digit length[30]. It was reported that the 2D:4D ratio of right hand is more sensitive to testosterone/estrogen ratio in the fetus then the ratio of left hand[36]. Therefore, in this study, Dr-l was also used as an additional indicator for the effect of sex hormones to analyze its correlation with body composition components.

2.3. Statistical analysis

SPSS version 25.0(IBM, U.S.A) program was used for statistical analysis, and means ± standard deviation(SD) of data ware calculated using descriptive statistics.Independent-sample *t*-test was used to analyze the sex differences in age, physical measures, 2D:4D ratios, and body composition components. Pearson's correlation coefficient was used to determine the relationship between the 2D:4D ratio and each body composition parameter. For all analyses, a p-value of < 0.05 was considered to be statistically significant.

3. Results

3.1. Study population and characteristics

The descriptive statistics of age, the observed anthropometric measures, and body composition parameters are presented in <Table 1>. There was no gender difference for age($t(91)=0.795$, $p=0.428$), Dr-l($t(91)=-0.273$, $p=0.785$), and % abdominal fat($t(91)=-1.903$, $p=0.060$). In the anthropometric measures, males were significantly taller($t(91)=13.921$, $p<0.001$) and heavier($t(91)=8.874$, $p<0.001$) than females. Also, the 2D:4D ratios were significantly lower in males than females for both hands(right hand: $t(91)=-2.663$, $p=0.009$; left hand: $t(91)=-2.841$, $p=0.006$)). This means that compared to women, men have a fourth finger length

that is relatively longerthan the second finger length. For the body composition parameters, BMI(t(91)=2.964, p=0.004), skeletal muscle mass(t(91)=17.195, p<0.001), % skeletal muscle(t(91)=13.380, p<0.001), SMI(t(91)=16.144, p<0.001), and % BMD(t(91)=13.769, p<0.001) were significantly higher in men than in women as expected, and body fat(t(91)=-4.162, p<0.001) and % body fat(t(91)=-10.601, p<0.001) were significantly lower in men than in women. However, there was no significant difference in the percentage of abdominal fat between males and females(t(91)=-1.903, p=0.060).

Table 1. Descriptive statistics for age, physical measures, 2D:4D ratios, and body composition parameters.

Variables	Men(n=60)	Women(n=33)
Age(yrs)	18.42± 0.74	18.30± 0.47
Height(cm)	175.34± 4.44	161.27± 5.05**
Weight(kg)	71.52± 7.53	56.82± 7.84**
R2D:4D	0.96± 0.03	0.98± 0.03*
L2D:4D	0.96± 0.03	0.98± 0.03*
Dr-l	0.0012± 0.0164	0.0022± 0.0158
BMI(kg/m^2)	23.27± 2.26	21.79± 2.36*
Body fat(kg)	11.04± 3.94	14.82± 4.55**
%Body fat	15.15± 4.47	25.65± 4.75**
Abdominal fat(%)	0.80± 0.04	0.81± 0.04
Skeletal muscle mass(kg)	34.42± 3.27	23.06± 2.58**
%Skeletal muscle	48.24± 2.57	40.78± 2.58**
SMI(kg/m^2)	9.81± 0.82	7.14± 0.65**
%BMD	3.56± 0.37	2.54± 0.29**

Note: Values are presented as mean ± SD.R2D:4D: Right hand 2D:4D, L2D:4D: Left hand 2D:4D, Dr-l: Difference between right 2D:4D and left 2D:4D, BMI: Body Mass Index, SMI: Skeletal Muscle Mass Index, BMD: Bone Mineral Density. *p<.01, **p<.001.

3.2. Associations between 2D:4D ratios and body composition parameters

Pearson correlation coefficients(r) of body composition parameters with right hand 2D:4D, left hand 2D:4D, and Dr-l for males and females are presented in <Table 2>. In the case of men, only skeletal mass was significantly correlated with the left hand 2D:4D ratio, and no significant correlation was found between other body composition variables and all finger length measures <Table 2>. On the other hand, in women, all variables in body composition parameters were not significantly correlated with the 2D:4D ratios in both hands and Dr-l <Table 2>.

Table 2. Pearson correlation coefficients(r) between digit length measures and body composition parameters.

Variables	Male			Female		
	R2D:4D	L2D:4D	Dr-l	R2D:4D	L2D:4D	Dr-l
BMI(kg/m^2)	0.082	0.181	-0.161	0.023	-0.013	0.036
Body fat(kg)	0.109	0.141	-0.049	-0.010	-0.022	-0.006
%Body fat	0.045	0.064	-0.020	0.059	0.052	0.006
Abdominal fat(%)	0.178	0.212	-0.030	-0.016	0.046	-0.094
Skeletal muscle mass(kg)	0.229	0.254*	-0.050	-0.119	-0.149	-0.008
%Skeletal muscle	-0.039	-0.052	0.014	-0.036	-0.031	-0.002
SMI(kg/m^2)	0.166	0.231	-0.112	-0.069	-0.108	0.018

%BMD	0.201	0.225	-0.044	-0.183	-0.208	-0.029

Note: BMI: R2D:4D: Right hand 2D:4D, L2D:4D: Left hand 2D:4D, Dr-l: Difference between right 2D:4D and left 2D:4D, BMI: Body Mass Index, SMI: Skeletal Muscle Mass Index, BMD: Bone Mineral Density. *p<.05.

4. Discussion

Scientific studies have shown that the 2D:4D ratio is determined by the balance between the effects of adrogens and estrogens in humans and mice[36][37]. They found that the activity of androgen receptor(AR) and estrogen receptor-α(ER-α)is more active on the fourth digit compared to the second digit, and inactivation of AR reduces the growth rate of the fourth digit and increases the 2D:4D ratio, whereas inactivation of ER-α increases the growth rate of the fourth digit, resulting in a decrease in the 2D:4D ratio[36]. In addition, changes in sex hormone levels during growth and adulthood have been investigated to affect changes in various body composition components including bone mineral density and muscle mass[25][38][39].

Based on the previous studies on the relationship between the 2D:4D ratio and sex hormones which have a great influence on the changes in body composition, this study examined the association between digit length measures(right and left hand 2D:4D ratio and Dr-l) and body composition parameters(BMI, body fat mass, % body fat, % abdominal fat, skeletal muscle mass, % skeletal muscle, SMI, % BMD) in young adults(a total of 99 men and women with an average age of 18.36 years) with an attempt to explore a way to easily track changes in body composition related to some diseases, such as loss of bone density and increase in body fat.

In this study, significant sexually dimorphic differences were found in all results of the anthropometric measures and body composition parameters except Dr-l and % abdomial fat. Men's height and weight were significantly higher than that of women, and among the body composition parameters, the variables related to fat free mass were also significantly higher than that of women. On the other hand, women were significantly higher than men in variables related to fat mass. In the case of the finger length ratio, the 2d:4d ratio of males was significantly lower than that of females, andsuch statistical significance was the same for both the right and left hands. The results of this study provide additional evidences that males tend to have a significantly higher prevalence of the male pattern 2D:4D ratio(lower 2D:4D), larger physique and more muscular, and the results this study, found in body size, body composition, and finger length ratio, are consistent with previous studies[40][41][42].

The main findings about the correlation results between the finger length measures and the body composition parameters of this study are that all variables related to body composition in women had no correlation with the finger length measures. Similarly, in the case of men, most of the body composition related variables showed no correlation with the finger length measures. However, there was only one statistically significant positive correlation was found between the right hand 2D:4D ration and skeletal muscle mass.

In previous studies on the correlation between BMI and finger length ratio, Kalichman, Batsevich, & Kobyliansky(2017) performed a research with middle-aged men and women, and they reported that BMI had a significant correlation with the right hand 2D:4D ratio in men[42]. In addition, Fink, Neave, & Manning(2003) in a sample of 50 males and 70 females found also significant positive correlation between BMI and left finger length ratio only in males[43]. On the other hand, Muller et al.(2013) examined association between the 2D:4D ratio and adult anthropometric measures including BMI, waist circumference, hip circumference, waist-to-hip ratio, fat mass, fat-free mass or percentage fat mass from 8840 women and 6076 men , and they found no significant correlation between them[44]. As another large sample size study, Fink, Manning, & Neave(2006) also reported no significant correlation between BMI and the

2D:4D ratio on body hands in males and females[45]. In addition, body composition parameters such as muscle mass and body circumference have been reported to be more associated with weight variables such as body weight than length measures[38]. Therefore, when considering the results of studies conducted on a large sample size and the specificity of BMI related to anthropometric parameters, digit length ratio does not seem to have a significant relationship with BMI.

Among the body composition components, the proportion of body fat and distribution characteristics of body fat are closely related to some diseases such as diabetes, hypertension, and cardiovascular disorder[46]. In particular, it is well known that abdominal fat is highly associated with health risks[46]. However,in relation to the association between finger length ratio and body fat-related parameters, most studies reported that there was no relationship between the 2D:4D ratio and body fat mass and % body fat, and these results are in accordance with the results of this study[44][45]. Also, regarding the association between finger length ratio and body fat accumulation area, it was hypothesized that prenatal androgen exposure may be related to abdominal adiposity[25] and McIntyre, Lipson, & Ellison(2003) suggested that prenatal androgen exposure may be related to rat accumulation in the abdomen[47]. However, in this study, the prenatal androgen effect was estimated as the 2D:4D ratio, and the abdominal fat was also not measured by a precise method such as CT or MRI, but the body weight was assumed to be abdominal fat. Therefore, it is unreasonable to conclude that the 2D:4D ratio is precisely correlated with abdominal fat accumulation. Body fat is mainly distributed in the hips and limbs in women, but in the abdomen and trunk in men, and this difference in body fat distribution is thought to be attributed to the ratio of adolescent/adult estrogen to testosterone[48][49]. Therefore, the relationship between the digit ratio and the location of body fat accumulation should be considered not only the abdominal fat but also the peripheral fat distribution.

In the current study, only male muscle mass had a positive correlation with the left hand 2D:4D ratio in this study. Regarding the relationship between finger ratio and muscle mass-related parameters, it was reported that serum testosterone and free testosterone concentrations were positively related to whole body lean mass and inversely to fat mass, and serum testosterone concentrations were also positively related to muscle cross sectional area healthy young men[38]. However, the 2D:4D ratio and arm circumference which used as an index of muscle mass did not related to circulating steroid concentrations. This means that muscle mass, especially in young men, is more closely related to the concentration of testosterone in the blood than to the finger length ratio. In addition, in a research that studied the relationship between the 2D:4D ratio and body composition in children aged 7 to 11, the 2D:4D ratio did not show a correlation with % muscle mass[50]. Although muscle mass was positively correlated with the 2D:4D ratio in the current study,the value of % skeletal muscle and SMI corrected for the absolute muscle mass by height or weight were not significantly correlated with the 2D:4D ratio. Therefore, the results of the present study are partially consistent with the results of the two previous studies mentioned above. On the other hand, according to Halilet et al.(2013), the 2D:4D ratio in both hands had a significant negative correlation with SMI and calf circumference, and such statistical significance was found in both men and women[51]. However, the results of this studywere conducted in the older adults over the age of 65. In this regard, Folland et al.(2012) suggested that the relationship between muscle mass and testosterone levels in men with normal gonads is less clear[52]. Thus, the association between finger length ratio and muscle mass-related parameters may be remarkable in older adults with decreased sex hormones, but in growing children and young adults with active sex hormone activity, the relationship between them does not seem to be.

Finally, in a previous study examining the relationship between finger ratio and bone density, Takahata and Hirokawa(2018) reported a significant positive correlation between the 2D:4D ratio and bone density in 19year-old women[53]. In another study examining

women aged 24-36 years old, the 2D:4D ratio showed a significant positive correlation with the bone mineral density of lumbar spine and femoral neck[54]. Moreover, Araziet et al.(2016) study performed with postmenopausal women showed also a significant positive correlation between the 2D:4D ratio and BMD, and the results of all previous studies were contrary to the results of the present study[55]. The most notable difference found in previous studies and the current study is the research methodology. That is, all previous studies used a measurement method with higher reliability in measuring bone mineral density such asan ultrasound bone densitometer and DEXA than the method used in this study. Regarding the bone mineral density, it was also pointed out that the correlation may vary depending on the stage of menstrual cycle[28]. However, considering that the subjects in the current study were all healthy young women, the subject matter does not seem to have a significant effect on the different outcomes from the previous studies, and the difference in research method seems to have a greater effect.

5. Conclusion

In conclusion, in this study, the relationship between the 2D:4D ratio and body composition parameters were analyzed in young adult males and females. There was a significant difference in the 2D:4D ratio between males and females, but there was no evidence of substantial associations between the finger length measures and body composition parameters measured by BIA in young adults in both genders. Although the 2D:4D ratio has been proposed as a marker of prenatal androgen action and of sensitivity to testosterone, these results found in the current study suggest that the relative ratio of the second and fourth finger length may not be a prophylactic indicator for predicting body composition differences and diseases related to sex hormones and finger length parameters.

6. References

6.1. Journal articles

[1] Buckwalter JA & Glimcher MJ & Cooper RR & Recker R. Bone Biology. I: Structure, Blood Supply, Cells, Matrix, and Mineralization. *Instructional Course Lectures*, 45, 371-386 (1996).

[2] Downey PA & Siegel MI. Bone Biology and the Clinical Implications for Osteoporosis. *Physical Therapy*, 86(1), 77-91 (2006).

[3] Robling AG & Castillo AB & Turner CH. Biomechanical and Molecular Regulation of Bone Remodeling. *Annual Review of Biomedical Engineering*, 8, 455-498 (2006).

[4] Datta HK & Ng WF & Walker JA & Tuck SP & Varanasi SS. The Cell Biology of Bone Metabolism. *Journal of Clinical Pathology*, 61(5), 577-587 (2008).

[5] Boirie Y. Physiopathological Mechanism of Sarcopenia. *Journal of Nutrition Health and Aging*, 13(8), 717-723 (2009).

[6] Cruz-Jentoft AJ & Baeyens JP & Bauer JM & Boirie Y & Cederholm T & Landi F & Martin FC & Michel JP & Rolland Y & Schneider SM & Topinková E & Vandewoude M & Zamboni M & European Working Group on Sarcopenia in Older People. Sarcopenia: European Consensus on Definition and Diagnosis: Report of the European Working Group on Sarcopenia in Older People. *Age and Aeing*, 39(4), 412-423 (2010).

[7] Ahn S. Eucommiae Cortex(Eucommia Ulmoides Oliver) Modulates Muscle Atrophy in Aged Mice. *Kinesiology*, 5(2), 65-69 (2020). [Article]

[9] Segal KR & Dunaif A & Gutin B & Albu J & Nyman A & Pi-Sunyer FX. Body Composition, not Body Weight, is Related to Cardiovascular Disease Risk Factors and Sex Hormone Levels in Men. *The Journal of Clinical Investigation*, 80(4), 1050-1055 (1987).

[10] Bray GA & Jablonski KA & Fujimoto WY & Barrett-Connor E & Haffner S & Hanson RL & Hill JO & Hubbard V & Kriska A & Stamm E & Pi-Sunyer FX & Diabetes Prevention Program Research Group. Relation of Central Adiposity and Body Mass Index to the Development of Diabetes in the Diabetes Prevention Program. *The American Journal of Clinical Nutrition*, 87(5), 1212-1218 (2008).
[11] Freedman DS & Khan LK & Dietz WH & Srinivasan SR & Berenson GS. Relationship of Childhood Obesity to Coronary Heart Disease Risk Factors in Adulthood: The Bogalusa Heart Study. *Pediatrics*, 108(3), 712-718 (2001).
[12] Engeland A & Bjørge T & Tverdal A & Søgaard AJ. Obesity in Adolescence and Adulthood and the Risk of Adult Mortality. *Epidemiology*, 15(1), 79-85 (2004).
[13] National Institutes of Health. Health Implication of Obesity: National Institutes of Health Consensus Development Statement. *Annals of Internal Medicine*, 103(1), 147-151 (1985).
[14] Byeon M & Park S & Choi E. Effects of A Wonderful Life Program on the Wellbeing Behaviors, Life Satisfaction and Subjective Quality of Life of Community Elderly People in Korea: Wonderful Life Program Includes Safety. *International Journal of Crisis & Safety*, 4(1), 1-7 (2019). [Article]
[15] Sung H & Park G. Public Value of Music. *Public Value*, 4(2), 12-18 (2019). [Article]
[16] Sung D & Park J & Lim W. Analysis of the Healing Effect of Walking Activities according to the Difference in Forest Environment. *Public Value*, 5(1), 1-16 (2020). [Article]
[17] Cho C. Comparison of Validity and Accuracy of Circumference, SKF, and BIA Method in Predicting % Body Fat. *Kinesiology*, 4(2), 14-21 (2019). [Article]
[18] Sakuma K & Yamaguchi A. Sarcopenia and Age-related Endocrine Function. *International Journal of Endocrinology*, 2012, n127362 (2012).
[19] Bhasin S & Storer TW & Berman N & Callegari C & Clevenger B & Phillips J & Bunnell TJ & Tricker R & Shirazi A & Casaburi R. The Effects of Supraphysiologic Doses of Testosterone on Muscle Size and Strength in Normal Men. *The New England Journal of Medicine*, 335(1), 1-7 (1996).
[20] Storer TW & Woodhouse L & Magliano L & Singh AB & Dzekov C & Dzekov J & Bhasin S. Changes in Muscle Mass, Muscle Strength, and Power but not Physical Function are Related to Testosterone Dose in Healthy Older Men. *Journal of the American Geriatrics Society*, 56(11), 1991-1999 (2008).
[21] Bhasin S & Storer TW & Berman N & Yarasheski KE & Clevenger B & Phillips J & Lee WP & Bunnell TJ & Casaburi R. Testosterone Replacement Increases Fat-free Mass and Muscle Size in Hypogonadal Men. *The Journal of Clinical Endocrinology and Metabolism*, 82(2), 407-413 (1997).
[22] Feldman HA & Longcope C & Derby CA & Johannes CB & Araujo AB & Coviello AD & Bremner WJ & McKinlay JB. Age Trends in the Level of Serum Testosterone and Other Hormones in Middle-Aged Men: Longitudinal Results from the Massachusetts Male Aging Study. *The Journal of Clinical Endocrinology and Metabolism*, 87(2), 589-598 (2002).
[23] Morley JE & Perry HM 3rd. Androgens and Women at the Menopause and Beyond. *The Journals of Gerontology. Biological Sciences and Medical Sciences*, 58(5), 409-416 (2003).
[24] Tagliaferri C & Wittrant Y & Davicco MJ & Walrand S & Coxam V. Muscle and Bone, Two Interconnected Tissues. *Ageing Research Reviews*, 21, 55-70 (2015).
[25] Abbott DH & Dumesic DA & Franks S. Developmental Origin of Polycystic Ovary Syndrome -A Hypothesis. *The Journal of Endocrinology*, 174(1), 1-5 (2002).
[26] Jamison CS & Meier RJ & Campbell BC. Dermatoglyphic Asymmetry and Testosterone Levels in Normal Males. *American Journal of Physical Anthropology*, 90(2), 185-198 (1993).
[27] Lutchmaya S & Baron-Cohen S & Raggatt P & Knickmeyer R & Manning JT. 2nd to 4th Digit Ratios, Fetal Testosterone and Estradiol. *Early Human Development*, 77(1-2), 23-28 (2004).
[29] Longman D & Stock JT & Wells JCK. Digit Ratio(2D:4D) and Rowing Ergometer Performance in Males and Females. *American Journal of Physical Anthropology*, 144(3), 337-341 (2011).
[30] Manning JT & Scutt D & Wilson J & Lewis-Jones DI. The Ratio of 2nd to 4th Digit Length: A Predictor of Sperm Numbers and Concentrations of Testosterone, Luteinizing Hormone and Oestrogen. *Human Reproduction*, 13(11), 3000-3004 (1998).

[31] Peters M & Mackenzie K & Bryden P. Finger Length and Distal Finger Extent Patterns in Humans. *American Journal of Physical Anthropology*, 117(3), 209-217 (2002).
[32] Klimek M & Galbarczyk A & Nenko I & Jasienska G. Women with More Feminine Digit Ratio (2D:4D) have Higher Reproductive Success. *American Journal of Physical Anthropology*, 160(3), 549-553 (2016).
[33] Cho C. Relationships between the Digit Ratio(2D: 4D) and Exercise-related Physical Fitness Components in Males and Females. *Kinesiology*, 5(1), 1-10 (2020). [Article]
[34] Chien MY & Huang TY & Wu YT. Prevalence of Sarcopenia Estimated Using a Bioelectrical Impedance Analysis Prediction Equation in Community-dwelling Elderly People in Taiwan. *Journal of the American Geriatrics Society*, 56(9), 1710-1715 (2008).
[35] Morishita S & Kaida K & Tanaka T & Itani Y & Ikegame K & Okada M & Ishii S & Kodama N & Ogawa H & Domen K. Prevalence of Sarcopenia and Relevance of Body Composition, Physiological Function, Fatigue, and Health-related Quality of Life in Patients before Allogeneic Hematopoietic Stem Cell Transplantation. *Supportive Care in Cancer*, 20(12), 3161-3168 (2012).
[36] Zheng Z & Cohn MJ. Developmental Basis of Sexually Dimorphic Digit Ratios. *Proceedings of the National Academy of Sciences*, 108(39), 16289-16294 (2011).
[37] Manning J & Kilduff L & Cook C & Crewther B & Fink B. Digit Ratio(2D:4D): A Biomarker for Prenatal Sex Steroids and Adult Sex Steroids in Challenge Situations. *Frontiers in Endocrinology*, 5, 9 (2014).
[38] De Naeyer H & Bogaert V & De Spaey A & Roef G & Vandewalle S & Derave W & Taes Y & Kaufman JM. Genetic Variations in the Androgen Receptor are Associated with Steroid Concentrations and Anthropometrics but not with Muscle Mass in Healthy Young Men. *PloS One*, 9(1), n86235 (2014).
[39] Drake MT & McCready LK & Hoey KA & Atkinson EJ & Khosla S. Effects of Suppression of Follicle-Stimulating Hormone Secretion on Bone Resorption Markers in Postmenopausal Women. *The Journal of Clinical Endocrinology and Metabolism*, 95(11), 5063-5068 (2010).
[40] Paul SN & Kato BS & Hunkin JL & Vivekanandan S & Spector TD. The Big Finger: The Second to Fourth Digit Ratio is a Predictor of Sporting Ability in Women. *British Journal of Sports Medicine*, 40(12), 981-983 (2006).
[41] Robertson J & Zhang W & Liu JJ & Muir KR & Maciewicz RA & Doherty M. Radiographic Assessment of the Index to Ring Finger Ratio(2D:4D) in Adults. *Journal of Anatomy*, 212(1), 42-48 (2008).
[42] Kalichman L & Batsevich V & Kobyliansky E. Finger Length Ratio and Body Composition in Chuvashians. *Collegium Antropologicum*, 41(1), 25-30 (2017).
[43] Fink B & Neave N & Manning JT. Second to Fourth Digit Ratio, Body Mass Index, Waist-to-hip Ratio, and Waist-to-chest Ratio: Their Relationships in Heterosexual Men and Women. *Annals of Human Biology*, 30(6), 728-738 (2003).
[44] Muller DC & Manning JT & Hopper JL & English DR & Giles GG & Severi G. No Strong Association between Second to Fourth Digit Ratio(2D:4D) and Adult Anthropometric Measures with Emphasis on Adiposity. *Annals of Human Biology*, 40(2), 201-204 (2013).
[45] Fink B & Manning JT & Neave N. The 2nd-4th Digit Ratio(2D:4D) and Neck Circumference: Implications for Risk Factors in Coronary Heart Disease. *International Journal of Obesity*, 30(4), 711-714 (2006).
[46] Goodpaster BH & Krishnaswami S & Harris TB & Katsiaras A & Kritchevsky SB & Simonsick EM & Nevitt M & Holvoet P & Newman AB. Obesity, Regional Body Fat Distribution, and the Metabolic Syndrome in Older Men and Women. *Archives of Internal Medicine*, 165(7), 777-783 (2005).
[47] McIntyre MH & Lipson SF & Ellison PT. Effects of Developmental and Adult Androgens on Male Abdominal Adiposity. *American Journal of Human Biology*, 15(5), 662-666 (2003).
[48] Rodríguez G & Samper MP & Olivares JL & Ventura P & Moreno LA & Pérez-González JM. Skinfold Measurements at Birth: Sex and Anthropometric Influence. *Archives of Disease In Childhood. Fetal and Neonatal Edition*, 90(3), 273-275 (2005).

[49] Björntorp P. Body Fat Distribution, Insulin Resistance, and Metabolic Diseases. *Nutrition*, 13(9), 795-803 (1997).
[50] Pruszkowska-Przybylska P & Sitek A & Rosset I & Sobalska-Kwapis M & Słomka M & Strapagiel D & Żądzińska E & Morling N. Associations between Second to Fourth Digit Ratio, Cortisol, Vitamin D, and Body Composition among Polish Children. *Scientific Reports*, 11(1), n7029 (2021).
[51] Halil M & Gurel EI & Kuyumcu ME & Karaismailoglu S & Yesil Y & Ozturk ZA & Yavuz BB & Cankurtaran M & Ariogul S. Digit(2D:4D) Ratio Is Associated with Muscle Mass(MM) and Strength(MS) in Older Adults: Possible Effect of in Utero Androgen Exposure. *Archives of Gerontology and Geriatrics*, 56(2), 358-363 (2013).
[52] Folland JP & Mc Cauley TM & Phypers C & Hanson B & Mastana SS. The Relationship of Testosterone and AR CAG Repeat Genotype with Knee Extensor Muscle Function of Young and Older Men. *Experimental Gerontology*, 47(6), 437-443 (2012).
[53] Takahata Y & Hirokawa K. Relationship between the Second to Fourth Finger Length Ratio and Calcaneus Quantitative Ultrasound. *Scientific Reports*, 8(1), n14603 (2018).
[54] Arazi H & Eghbali E. The Relationship between Second-to-fourth Digit Ratio(2D: 4D), Muscle Strenght and Body Composition to Bone Mineral Density in Young Women. *Kinesiology*, 51(2), 238-245 (2019).
[55] Arazi H & Eghbali E & Saeedi T & Moghadam R. The Relationship of Physical Activity and Anthropometric and Physiological Characteristics to Bone Mineral Density in Postmenopausal Women. *Journal of Clinical Ensitometry*, 19(3), 382-388 (2016).

6.2. Books

[28] Manning JT. Digit Ratio: A Pointer to Fertility, Behavior, and Health. Rutgers University (2002).

6.3. Additional references

[8] https://www.niams.nih.gov/ (2019).

7. Contribution

7.1. Authors contribution

	Initial name	Contribution
Lead Author	CC	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑ -Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑

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The Effects of Internal Marketing and Career Motivation for the PROTECTION of Dermatology Hospital Workers on Job Satisfaction and Organizational Commitment

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Abstract

Purpose: *The purpose of this study is to provide implications for efficient manpower management and successful organizational performance by identifying the influential factors that internal marketing and career motivation have on job satisfaction and organizational commitment for medical skincare workers*

Method: *This study used the SPSS 22.0 program as an empirical method of analyzing 350 copies of an online survey conducted among medical skincare workers in 17 cities and provinces nationwide and performed multiple regression analysis to examine the effects of internal marketing and career motivation on job satisfaction and organizational commitment.*

Results: *As a result of this study, the hypothesis 1, internal marketing will affect job satisfaction, showed that internal communication has a significant positive(+) effect on intrinsic satisfaction and management support, internal communication, and compensation systems have a significant positive(+) effect on extrinsic satisfaction. In the hypothesis 2, career motivation will affect job satisfaction, it was found that career insight, career resilience, and career identity have a significant positive(+) effect on intrinsic satisfaction while career resilience and career identity have a significant positive(+) effect on extrinsic satisfaction.Similarly,in hypothesis 3, job satisfaction will affect organizational commitment, intrinsic satisfaction and extrinsic satisfaction were found to have a significant positive(+) effect on organizational commitment.*

Conclusion: *Identifying and presenting internal marketing factors to achieve career goals and satisfy workers through this studyiscrucial for organizational performance.Therefore, it is deemed necessary to provide opportunities for career development activities through smooth communication between management and workers, education, training, and compensation policiesto protect the work of medical skincare workers by creating a work environment that satisfies and encourages them to actively concentrate on their work even in unfavorable situations.*

[Keywords] ***Medical Skincare Workers, Internal Marketing, Career Motivation, Job Satisfaction, Organizational Commitment***

1. Introduction

With a high standard of living brought by rapidly growing economy, consumers′interest in skincareas well as the size of the skin market have increased[1][2]. In this recent time of rapid changes when the importance of healthcare providers, as important figures in hospitals, is coming to the fore[3][4][5], the rate of increase/decrease of clinics by medical subject, according to the 2013 statistics on clinics inthe metropolitan area bythe National Statistical Office, plastic surgery increased by 20.1% and dermatologyincreased by 18.6% during the past 5 years[6]. With the increased number of clinics, the number of related workers is expected to have increased as well. Furthermore, in hospi-

tals and clinics which provide medical treatment and beauty services, the need for staff protection has become prominent with a great emphasis on manpower that can achieve high performance[7]. Accordingly, various management techniques have been introduced into medical organizations and increased the interest in internal marketing and internal customers to enhance organizational performance[8].

As previous research on internal marketing showed that the internal marketing of a company has a positive effect on corporate performance by enhancing the quality of customer service through-increasing the job satisfaction of workers[9], compensation system, delegation of authority, education and training, management support, and welfare benefits among other internal marketing factors have a positive effect on customer orientation[10], andgood internal communication induces organizational members' commitment by improving the relationship between the members[11], such variables may serve as an important factor.

In addition, it is a crucial factor since those with high career motivation can increase employability through positive reinforcement by recognizing the difference between the current level and the target level with a career direction, overcoming difficulties and cultivating career resilience and career insight[12]. In other words, those with high career motivation can affect their own behavior and attitude to cope with career drawbacks such as promotion failure or unemployment, whereas career development is a necessity for all people regardless of age, especially when the environment expects continuous knowledge and ability growth[13].

Hospital organizationsinevitably have conflicts as they are composed of people with various characteristics, expertise, and occupation and such conflicts are known to affect job satisfaction, organizational commitment, and the functioning of the organizations[14]. On the other hand, as creating an environment fororganizational members to concentrateon their jobs can enhancetheir performance or induce desirable behaviors[15] and work atmosphere or freedom of expression and behavior in the organization can increase job satisfaction[16], it can be expected that the higher the job satisfaction of employees working in a hospital, the higher the hospital's profits[17]. In addition, job satisfaction from the workers' perspective is, first, important from the standpoint of value judgment. Since workers spend most of their time at work, if they have the opportunity to find satisfaction there, they will be able to enjoy life. Second, it is important from a mental standpoint. When workers feel dissatisfied with a part of their life, the dissatisfaction can transfer to other unrelated parts. Third, it is also important in the physical aspect. Chronic dissatisfaction with work builds up stress, that can impact physical health and cause many diseases[18].

Organizational commitment refers to the degree of attachment to the organization to which one is affiliated, and can be expressed as loyalty and devotion to the organization[19]. Mowday, Porter & Steers(1982) regarded organizational commitment as having an important meaning for both organizations and individuals. From the individual's point of view, immersion in the organization can provide not only external rewards but also a sense of psychological satisfaction; and from the organization's point of view, a high organizational commitment of its members can be beneficial in pursuing goals in relation to absenteeism, turnover, and performance[20].

In other words, individuals' job satisfaction and organizational commitment are suggested as the main concepts that contribute to improving performance and induce positive behavior towards the organization[21]. Job satisfaction and organizational commitment can be seen as fundamental factors because they can protect employees in terms of physical, mental and psychological aspects.

Previous studies include studies on the relationship between internal marketing factors of hospital nursing organizations and nurses' job satisfaction and organizational commitment[22], the effect of hospital internal marketing on job satisfaction, job commitment, organizational commitment, and customer orientation[15], and the relationship between turnover intention, internal marketing, career motivation and job satisfaction of employees who are working as a customer contact point at five-star hotels[13]. Research on internal marketing and job satisfaction has been conducted relatively more. Most of the previous studies are on occupations at hospitals and hotels whereas studies on career motivation and job commitment are insufficient and research on the protection of employees who directly provide servicesin dermatology hospitals is particularly lacking. Therefore, this study

made an attempt to present implications on the quality of customer service and successful organizational performance by encouraging medical skincare workers to achieve their career goals by protectingthem from internal environmental system and increasing their satisfaction via protecting the workers, securing competitiveness and increasing organizational performance of medical skincare clinics as a means of internal marketing and career motivation, and presenting the importance of efficient manpower management through employee satisfaction and organizational commitment.

2. Research Method

2.1. Research subject

This study was conducted from October 1, 2020 to March 11, 2021 in 17 cities and provinces nationwide to investigate the impact of internal marketing and career motivation for the protection of employees at dermatology hospitals on job satisfaction and organizational commitment by distributingand collecting a total of 370 online questionnaires and consent forms. Excluding unfaithful 20 copies, 350 copies were selected and analyzed.

2.2. Survey method

In this study, an online questionnaire method was used as the survey tool to empirically analyze the research problems. The questionnaire consisted of a total of 69 5-point Likert scale questions, including 24 internal marketing questions[13], 19 career motivationquestions[13], 20 job satisfaction questions[13], and 6 organizational commitment questions[13].

2.3. Research problems

H1, Internal marketing will affect job satisfaction

H2, Career motivation will affect job satisfaction

H3, Job satisfaction will affect organizational commitment

2.4. Data processing

After data coding and data cleaning, the study data was statistically processed and analyzed using the SPSS 22.0 statistical package program. Data analysis was conducted sequentially according to the research problems as listed below:

First, a frequency analysis was conducted to examine the general characteristics of the subjects.

Second, factor analysis and reliability analysis were performed to understand each dimension of internal marketing, career motivation, job satisfaction, and organizational commitment. Principal component analysis was used as the factor extraction method, and Varimax was selected as the factor rotation method. Reliability analysis of the variables was carried out using Cronbach's α value, which can examine the internal consistency of the variables.

Third, correlation analysis was conducted to understand the correlations among internal marketing, career motivation, job satisfaction, and organizational commitment.

Fourth, multiple regression analysis was carried outto investigate the effects of internal marketing and career motivation on job satisfaction.

Fifth, multiple regression analysis was conducted to investigate the effects of job satisfaction on organizational commitment.

3. Results

3.1. Reliability and validity check

To verify the validity of the measurement tool used in this study an exploratory factor analysis was conducted. Among the factor analysis methods, a principal- analysis was used to minimize information loss while extracting factors that explain as much of the variance of the original variables as possible, and factors were analyzed using Varimax rotation until their structure was most pronounced while maintaining their independence. Factor classification was composed of one factor when the eigen value was 1 or more, and when the factor loading exceeded .40, it was classified as a corresponding factor. Internal marketing was finally analyzed in 24 items where no questions were excluded; career motivation, 19 questions without exclusions; job satisfaction, 20 questions without exclusions; organizational commitment, 6 questions without exclusions.

Next, the reliability analysis using Cronbach's alpha coefficient showed that the reliability coefficient of all variables was 0.7 or higher, indicating good reliability.

3.1.1. Verification of the validity and reliability of internal marketing

The validity and reliability verification process for internal marketing is as shown in below <Table 1>. As a result of factor analysis, a total of three factors were derived with a variance explanatory power of 63.265%. The first factor 1, which has a variance explanatorypower of 45.755%, was named "management support", and the second factor 2, with a variance explanatory power of 10.843%, was named "internal communication". Lastly, the third factor 3 was named "compensation system," and its variance explanatory power was found to be 6.667%. The three factors derived were observed to be valid with a loading value of 0.7 or higher, and their reliability also showed no problem with a reliability level of 0.6 or higher.

Table 1. Internal marketing factor analysis.

Items	Factor		
	1.	2.	3.
The management(director) of our hospital encourages open communication.	.775	.191	.235
Our hospital has an atmosphere that allows easy access to the management(director).	.767	.168	.159
Our hospital allows its staff to have discretion in making decisions.	.734	.183	.275
Our hospital's management(director) engages its staff in the planning and decision-making processes.	.722	.101	.358
It is allowed to actively and freely express one's own opinions in our hospital.	.651	.450	.127
The management(director) of our hospital investigates and evaluates business cooperation between departments and staff well.	.650	.203	.385
Our hospital trusts the judgment of its staff.	.646	.366	.242
Our hospital respects creative thinking.	.621	.340	.301
Our hospital allows its staff to make their own judgments when solving problems.	.551	.133	.317
The management(director) of our hospital provides guidance for solving work-related problems.	.529	.419	.151
Our hospital encourages its staff to receive education and training.	.123	.800	.207

The education and training provided by our hospital is very valuable.	.213	.793	.265
In our hospital, education and training for the staff are adequately provided.	.133	.776	.310
I will actively participate in education and training if the opportunity is given.	.128	.668	-.132
Business-related information and opinions are well exchanged among the employees of our hospital.	.482	.634	.077
In our hospital, employees well exchange opinions on matters outside of work.	.458	.598	.110
In our hospital, work-related cooperation is well established between related departments.	.545	.569	.099
In addition to a formal business reporting channel, our hospital also has an informal communication channel for opinions.	.405	.501	.183
Our hospital's compensation policy is properly implemented.	.279	.129	.826
Our hospital rewards employees for providing ideas to help improve their work.	.364	.058	.793
Our hospital has a system that reflects customer evaluations to employee compensation.	.175	.022	.783
Our hospital's compensation policy is implemented fairly.	.264	.221	.771
Those who provide information beneficial to our hospital are provided with commensurable reward	.376	.089	.745
Our hospital has a reward system for sales or work performance.	.094	.326	.727
Eigenvalue	10.981	2.602	1.600
Variance explanation	45.755	10.843	6.667
Accumulated explanation	45.755	56.598	63.265
Reliability	.920	.889	.911

KMO=.939, Bartlett x^2=5771.262(p<.001)

3.1.2. Verification of the validity and reliability of career motivation

The validity and reliability verification results for career motivation are as shown in below <Table 2>. As a result of factor analysis, a total of three factors were derived with a total variance explanatory power of 68.925%. The first factor 1, which has a variance explanatorypower of 55.543%, was named ″career insight″, and the second factor 2, with a variance explanatory power of 7.728%, was named ″career resilience″. Lastly, the third factor 3 was named ″career identity,″ and its variance explanatory power was found to be 5.655%. The three factors derived were observed to be valid with a loading value of 0.7 or higher, and their reliability also showed no problem with a reliability level of 0.6 or higher.

Table 2. Career motivation factor analysis.

Items	Factor		
	1.	2.	3.

I know my weaknesses(what I can't do well).	.831	.185	.145
I focus on the tasks I am currently assigned to.	.813	.170	.316
I look for a better way to do my job.	.784	.357	.261
I know my strengths(what I do well).	.737	.431	.182
I think I have expertise in my current field of work.	.678	.169	.502
I tend to think in advance of how to get the job done before my boss orders me.	.635	.403	.253
I am able to adapt well to changes in the environment related to my career.	.609	.559	.165
Even in situations where the outcome is uncertain, I take risks and act actively.	.182	.773	.174
I positively accept changes, such as changes in work.	.363	.699	.201
I have a clear career goal.	.147	.679	.482
I have anattainable career goal.	.350	.632	.399
I can cope well with problems in my work.	.533	.572	.243
I revise my career goals as circumstances change.	.426	.526	.325
I am carrying out career development activities related to my current job.	.257	.239	.821
I tend to voluntarily take on important tasks in consideration of the possibility of promotion or development in the future.	.245	.332	.719
Even in my personal time, I often do activities that are helpful for my work.	.195	.304	.621
I have taken a work-related degree or qualification course.	.513	.011	.601
I have a specific career plan to achieve my career goals.	.112	.545	.601
I look for work that can help me achieve my career goals.	.393	.484	.519
Eigenvalue	10.553	1.468	1.074
Variance explanation	55.543	7.728	5.655
Accumulated explanation	55.543	63.270	68.925
Reliability	.933	.866	.845

KMO=.948, Bartlett x^2=5138.455 (p<.001)

3.1.3. Verification of the validity and reliability of job satisfaction

The validity and reliability verification results for job satisfaction are as shown in below <Table 3>. As a result of factor analysis, a total of two factors were derived with a total variance explanatory power of 62.960%. The first factor 1, which has a variance explanatory power of 50.007%, was

named ″intrinsic satisfaction″, and the second factor 2, with a variance explanatory power of 12.953%, was named ′extrinsic satisfaction. The two factors derived were observed to be valid with a loading value of 0.7 or higher, and their reliability also showed no problem with a reliability level of 0.6 or higher.

Table 3. Job satisfaction factor analysis.

Items	Factor	
	1.	2.
I am satisfied that I can speak using my abilities.	.889	.078
I am satisfied that my work does not violate my conscience.	.848	.070
I am satisfied with being able to do something for others.	.833	.082
I am satisfied with the sense of accomplishment I get through my work.	.828	.235
I am satisfied with the opportunity to do get the job done in my own way.	.788	.302
I am satisfied with the autonomy to make my own judgements.	.779	.352
I am satisfied that I can work independently.	.753	.288
I am satisfied that I can do a variety of things that do not generally repeat.	.647	.262
I am satisfied that I can order others what to do.	.643	.338
I am satisfied with the opportunity to become an “important person” (a well-recognized person) at work.	.631	.462
I am satisfied with the relationship I have with my coworkers.	.590	.430
I am satisfied with the way in-house policies are implemented.	.256	.809
I am satisfied with the salary level compared to my workload.	-.057	.794
I am satisfied with the promotion opportunity.	.100	.774
Satisfied with the working environment.	.349	.733
I am satisfied with mysuperior's ability to make decisions.	.223	.723
I am satisfied with the degree to which I have been recognized for my job performance ability.	.380	.721
I am satisfied with the way howsuperiors treat subordinates.	.259	.697
I am satisfied with the amount of work assigned to me.	.338	.572
I am satisfied with the stability of my job.	.507	.519
Eigenvalue	10.001	2.591
Variance explanation	50.007	12.953
Accumulated explanation	50.007	62.960
Reliability	.942	.906

KMO=.951, Bartlett x^2=5033.819(p<.001)

3.1.4. Verification of the validity and reliability of job organizational commitment

The validity and reliability verification results for organizational commitment are as shown in below <Table 4>. As a result of factor analysis, a total of one factor was derived with a total variance explanatory power of 69.262%. The first factor 1, which has a variance explanatory power of 69.262%, was named "organization commitment." The factor derived was observed to be valid with a loading value higher than 0.7 and reliable with a reliability level higher than 0.6.

Table 4. Organizational commitment factor analysis.

Items	Factor
	Organizational commitment
I think our hospitalis a good place to work.	.883
I am proud of our hospital.	.873
I have affection for our hospital.	.865
My values and the management policy of our hospital are similar.	.816
I feel a sense of belonging to our hospital.	.789
I think our hospital is the best place to work.	.760
Eigenvalue	4.156
Variance explanation	69.262
Accumulated explanation	69.262
Reliability	.909

KMO=.853, Bartlett x^2=1468.815(p<.001)

3.2. Analysis of the correlation among internal marketing, career motivation, job satisfaction, and organizational commitment

The results of the correlation analysis between internal marketing and job satisfaction are shown in <Table 5>. A significant positive correlation(r=.722**) was observed between internal marketing and job satisfaction. Management support, which is a subcategory of internal marketing, showed a significant positive(+) correlation with intrinsic satisfaction(r-.504**) and extrinsic satisfaction(r=.687**), which are sub-factors of job satisfaction. Internal communication showed a significant positive(+) correlation with intrinsic satisfaction(r=.697**) and extrinsic satisfaction(r=567**). Similarly, the compensation system was also found to have a significant positive(+) correlation with intrinsic satisfaction(r=.294**) and extrinsic satisfaction(r=.616**).

The results of the correlation analysis between career motivation and job satisfaction are shown in <Table 5>. A significant positive correlation(r=.776**) was found between career motivation and job satisfaction. Career insight, which is a subcategory of career motivation, showed a significant positive(+) correlation with intrinsic satisfaction(r=.848**) and extrinsic satisfaction(r=.364**), which are sub-factors of job satisfaction, and the second sub-factor career resilience showed correlation with intrinsic satisfaction(r=.763**) and extrinsic satisfaction(r=488**). Similarly, career identity also

showed a significant positive(+) correlation with intrinsic satisfaction(r=.723**) and extrinsic satisfaction(r=.476**).

The results of the correlation analysis between job satisfaction and organizational commitment are shown <Table 5>. A significant positive(+) correlation(r=.716**) was found between job satisfaction and organizational commitment. Intrinsic satisfaction, which is a subcategory of job satisfaction, showed a significant positive(+) correlation(r=560**) with organizational commitment and extrinsic satisfaction also showed a significant positive correlation(r=.760**) with organizational commitment.

Table 5. Correlation analysis.

	Internal marketing	Career motivation	Job satisfaction	Organizational commitment	Management support	Internal communication	Compensation system	Career insight	Career resilience	Career identity	Intrinsic satisfaction	Extrinsic satisfaction
Internal marketing	1											
Career motivation	.525**	1										
Job satisfaction	.722**	.776**	1									
Organizational commitment	.746**	.449**	.716**	1								
Management support	.929**	.420**	.645**	.699**	1							
Internal communication	.843**	.675**	.710**	.600**	.695**	1						
Compensation system	.779**	.229**	.479**	.606**	.629**	.439**	1					
Career insight	.438**	.925**	.708**	.349**	.343**	.648**	.102	1				
Career resilience	.469**	.912**	.714**	.412**	.383**	.569**	.235**	.760**	1			

Career identity	.513**	.903**	.683**	.459**	.410**	.604**	.292**	.726**	.784**	1		
Intrinsic satisfaction	.592**	.863**	.928**	.560**	.504**	.697**	.294**	.848**	.763**	.723**	1	
Extrinsic satisfaction	.731**	.486**	.870**	.760**	.687**	.567**	.616**	.364**	.488**	.476**	.622**	1

Note: *p<.05, **p<.01.

3.3. Hypothesis verification

3.3.1. Verification of hypothesis 1

<Table 6> shows the results of multiple regression analysis conducted to verify the effects of internal marketing on intrinsic satisfaction. As a result of the analysis, the explanatory power of the regression model was found to be 48.7%, and the regression equation was analyzed to be statistically significant(F=109.788, p<.001). In terms of independent variables, it was found that internal communication(β=.067, p<.001), a sub-factor of internal marketing, has a statistically significant positive(+) effect on the dependent variable 'intrinsic satisfaction'.

Table 6. The effects of internal marketing on intrinsic satisfaction.

Dependent variable	Item	B	S.E	β	t	p	F(R^2)
Intrinsic satisfaction	(Constant)	.871	.136		6.412	.000	109.788*** (.487)
	Management support	.067	.066	.063	1.020	.308	
	Internal communication	.693	.055	.067	12.540	.000***	
	Compensation system	-.037	.045	-.040	-.805	.421	

Note: *p<.05, **p<.01, ***p<.001.

<Table 7> shows the results of multiple regression analysis conducted to verify the effects of internal marketing on extrinsic satisfaction. As a result of the analysis, the explanatory power of the regression model was found to be 54.3 %, and the regression equation was analyzed to be statistically significant(F=.137.483, p<.001). In terms ofindependent variables, it was found that management support(β=.378, p<.001), internal communication(β=.171, p<.001), and compensation system(β=.303, p<.001), which are sub-factors of internal marketing, have a statistically significant positive(+) effect on the dependent variable 'extrinsic satisfaction'.

Table 7. The effects of internal marketing on extrinsic satisfaction.

Dependent variable	Item	B	S.E	β	t	p	F(R^2)
Extrinsic satisfaction	(Constant)	.611	.118		5.158	.000	137.483*** (.543)
	Management support	.371	.057	.378	6.481	.000***	
	Internal communication	.164	.048	.171	3.399	.001**	

	Compensation system	.257	.040	.303	6.492	.000***	

Note: *p<.05, **p<.01, ***p<.001.

3.3.2. Verification of hypothesis 2

<Table 8> shows the results of multiple regression analysis conducted to verify the effects of career motivation on intrinsic satisfaction. As a result of the analysis, the explanatory power of the regression model was found to be 75.7 %, and the regression equation was analyzed to be statistically significant(F=360.946, p<.001).In terms of independent variables, it was found that career insight(β=.598, p<.001), career resilience(β=.213, p<.001), and career identity(β=.121, p<.001), which are sub-factors of career motivation, have a statistically significant positive(+) effect on the dependent variable 'intrinsic satisfaction'.

Table 8. The effects of career motivation on intrinsic satisfaction.

Dependent variable	Item	B	S.E	β	t	p	F(R^2)
Intrinsic satisfaction	(Constant)	.417	.085		4.907	.000	360.946*** (.757)
	Career insight	.527	.038	.598	13.890	.000***	
	Career resilience	.215	.048	.213	4.475	.001***	
	Career identity	.119	.044	.121	2.696	.007**	

Note: *p<.05, **p<.01, ***p<.001.

<Table 9> shows the results of multiple regression analysis conducted to verify the effects of career motivation on extrinsic satisfaction. As a result of the analysis, the explanatory power of the regression model was found to be 26.5 %, and the regression equation was analyzed to be statistically significant(F=41.644, p<.001). In terms of independent variables, it was found that career resilience(β=.348, p<.001), and career identity(β=.278, p<.001), which are sub-factors of career motivation, have a statistically significant positive(+) effect on the dependent variable 'extrinsic satisfaction'.

Table 9. The effects of career motivation on extrinsic satisfaction.

Dependent variable	Item	B	S.E	β	t	p	F(R^2)
Extrinsic satisfaction	(Constant)	1.468	.137		10.736	.000	41.644*** (.265)
	Career insight	-.084	.061	-.103	-1.379	.169	
	Career resilience	.325	.077	.348	4.197	.000***	
	Career identity	.252	.071	.278	3.550	.000***	

Note: *p<.05, **p<.01, ***p<.001.

3.3.3. Verification of hypothesis 3

<Table 10> shows the results of multiple regression analysis conducted to verify the effects of jobsatisfaction on organizational commitment. As a result of the analysis, the explanatory power of the regression model was found to be 59.0 %, and the regression equation was analyzed to be statistically significant(F=249.956, p<.001).In terms of independent variables, it was found that intrinsicsatisfaction(β=.143, p<.001) and extrinsicsatisfaction(β=.671, p<.001), which are sub-factors of jobsatisfaction, have a statistically significant positive(+) effect on the dependent variable 'organizationalcommitment'.

Table 10. The effects of job satisfaction on organizational commitment.

Dependent variable	Item	B	S.E	β	t	p	F(R^2)
	(Constant)	.261	.126		2.072	.039	
Organizational commitment	Intrinsicsatisfaction	.150	.046	.143	3.254	.001***	249.956*** (.590)
	Extrinsicsatisfaction	.761	.050	.671	15.288	.000***	

Note: *p<.05, **p<.01, ***p<.001.

4. Conclusion

Thestudy was conductedto verify the effects of internal marketing and career motivation on job satisfaction and organizational commitment for efficient manpower management and successful organizational performance in dermatology hospitals. To achieve the research purpose, 350medicalskincareworkers nationwideweresurveyedusinga self-administered questionnaire and the analysis results are as follows;

First, hypothesis 1, internal marketing will affectjob satisfaction, was found to have a significant positive(+) effect.Inparticular,internal communication, a sub-factor of internal marketing, was found to have a significant positive(+) effect on intrinsic satisfaction, whereas management support, internal communication, and compensation systems were found to have a significant positive(+) effect on extrinsic satisfaction.Theresultsaresimilar tothefindingsmade through theresearch conductedby HyunjuKim, Donghwa Shin[23], and Gyeonghwa Kim[24], and indicate that smooth communication between the management and organization, active support by the management, and appropriate compensation can increase job satisfaction and reduce the turnover rate by satisfying workers.

Second, hypothesis 2, which states that career motivation will affect job satisfaction, showed a significant positive(+) effect. Inparticular, career insight, career resilience, and career identity, which are sub-factors of career motivation, were found to have a significant positive(+) effect on intrinsic satisfaction, whereascareer resilience andcareer identity were found to have a significant positive(+) effect on extrinsic satisfaction. The findings are similar to the results of research conducted by Sohyun Lim[13] and suggest that planning career goals by developing career and cultivating expertise through one's own work can provide a positive sense of satisfaction. Therefore, continuously providing opportunities to workers for their career development and career goals and satisfying the values pursued by the workers are expected to improve the service quality.

Lastly, for the hypothesis 3, job satisfaction will affect organizational commitment, intrinsic satisfaction and extrinsic satisfaction, which are sub-factors of job satisfaction, were found to have a significant positive(+) effect on organizational commitment. It shows a trend similar to the research results of Sookhee Oh[14], proving internal marketing factors affect organizational commitment through job satisfaction.The higher the job satisfaction means the higher the sense of accomplishment, reward, and responsibility for the job, which in turn, improves work performance and contributes to efficient manpower management. Therefore, it is necessary to identify factors that can increase job satisfaction through internal marketing and apply them to workers in an attempt to protect the working environment of the workers and further increase organizational commitment.

Consequently, a great emphasis has been placed on the necessity to provide opportunities for career development activities and protect the workers through smooth communication between managementand workers of dermatology departments, education, training, and compensation policies to create a work environment that satisfies the workers and encourages them to actively concentrate on their work even in unfavorable situations. However, research on internal marketing for dermatology hospital workers is significantly insufficient. In future studies, specific factorsrelated to academic scalability and creativity, such as gender, turnover intention, and customer orientation need to be

examined from various standpoints for their positive or negative impacts on effective manpower management and organizational performance.

5. References

5.1. Journal articles

[1] Ha KW & Ka KW & Kim JH. Effects of the Work Ethic in Private Security Guards on Job Attitude and Job Immersion are Investigated. *International Journal of Criminal Study*, 1(2), 24-29 (2016). [Article]

[2] Kim TS & Lee JB. Analysis of Perception of Naturopathy Convergence and Utilization Satisfaction Perceived by Skin Beauty Industry Workers. *Protection Convergence*, 5(2), 94-102 (2020). [Article]

[3] Bong CK. A Study on Stress, Self-esteem and Resilience for Korean Nursing Students' Safety Management. *International Journal of Crisis & Safety*, 4(1), 8-18 (2019). [Article]

[4] We HJ & Lee JB & Kim EJ. Exploring the Experience of Job Convergence Change in the Beauty and Health Industry Using Grounded Theory. *Protection Convergence*, 5(2), 84-93 (2020). [Article]

[5] Kim JH & Keng KN & Kim JM & Yun YO & Han JW. Examination of the Role of Self-efficacy and Development of an Integrated Model to Overcome Nursing Staff Shortage Crisis at Small and Medium Sized Hospitals in Korea. *International Journal of Crisis & Safety*, 3(1), 1-16 (2018). [Article]

[7] Chu KW & Jung JH. Impact of Internal Marketing on Job Satisfaction, Job Involvement, Customer Orientation and Job Performance of the Employees in Securities Firm's Branch. *The Korea Contents Society*, 20(5), 476-499 (2020).

[8] Choi EH & Kim JH & Lee HS & Jang EH & Kim BS. The Effect of the Intramural Marketing Activitieson Nurses' Job Satisfaction and Turnover Intention. *Journal of Korean Clinical Nursing Research*, 15(1), 29- 41 (2009).

[9] Cho ST & Kim Y. The Effects of Internal Marketing Activities, Employee's Job Satisfaction on Consumer Orientation and Turnover Intention. *Journal of the Korean Soc Beauty and Art*, 10(4), 75-86 (2009).

[10] Park JE & Kim SA & Park SC. An Empirical Study in How the Internal Marketing Affects the Customer Orientation. *The Journal of Professional Management*, 21(4), 303-324 (2018).

[11] Shin SH & Jung JH & Shin JI. The Effects of Internal Marketing Perceived by Nurses on Self-efficacy and Hospital Image. *Journal of the Korean Society of Computer and Information*, 24(5), 103-111 (2019).

[12] Kang IJ. The Relationships among Employability, Career Related Learning and Career Motivation of Office Workers in Large Corporations. *Journal of Agricultural Education and Human Resource Development*, 48(1), 1-25 (2016).

[14] Oh SH & Moon ST & Kang HS. Relationships among Nurses' Internal Marketing, Occupational Satisfaction and Organizational Commitment. *Korea Journal of Occupational Health Nursing*, 20(1), 65-73 (2011).

[15] Choi HJ & Yang JH & Chang DM & Lee BH & Kim JS. Impact of Internal Marketing on Job Satisfaction, Job Commitment, Organizational Commitment, and Customer Orientation in Hospital Employees. *The Korea Contents Society*, 14(11), 783-798 (2014).

[16] Kang CK. Effect on the Internal Organizational Culture Attributes Job Performance and Job Satisfaction in Hospital. *Journal of the Korea Academia-Industrial Cooperation Society*, 19(6), 484-492 (2018).

[17] Cha JB & Ryu GY. Effects of Job Satisfaction and Patients Satisfaction on Medical Profit at Public Hospitals. *Korean Journal of Hospital Management*, 19(2), 12-21 (2014).

[18] Jun YS & Jeon YJ. A Study on Job Satisfaction of Hotel Employees. *Collection of Dissertations*, 8(2001), 443-465 (2001).

[19] Shin JH & Tak JK. The Effects of Behavioral Integrityand Leader Legitimacy Perceptionon Job Satisfaction and Organizational Commitment: The Moderating Effects of Supervisor's Collaborative Communication and Follower's Conscientiousness. *Korean Journal of Industrial and Organization-*

al Psychology, 24(2), 385-407 (2011).
[20] Chang JY & Choi HB. The Mediating Effect of Autonomous Motivationon the Relationship between Psychological Empowerment and Organizational Commitment. *Korean Journal of Industrialand Organizational Psychology*, 20(2), 113-133 (2007).
[21] Lee YT. The Impact of Psychological Capitalon Job Satisfaction and Organizational Commitment among Employees of Social Enterprises. *Daehan Academy of Management Information Journal*, 33(1), 1-16 (2014).
[22] Kim SI & Cha SK & Lim JY. A Correlational Study among Internal Marketing Factor, Nurse's Job Satisfaction, and Organizational Commitment in Hospital Nursing Organization. *Journal of Korean Public Health Nursing*, 15(1), 42-55 (2001).
[23] Kim HJ & Shin DH. The Influence of Pre-chase's Internal Marketing on Job Satisfaction in theBeauty Industry. *Journal of Convergence for Information Technology*, 21(9), 321-330 (2020).
[24] Kim KH. A Study on Effects of Internal Marketing on Secretaries' Job Satisfaction and Organizational Commitment in IT Companies. *Journal of The Korea Society of Computer and Information*, 16(6), 187-194 (2011).

5.2. Thesis Degree

[13] Im SH. The Relationship between Turnover Intention, Internal Marketing, Career Motivation andJob Satisfaction of Luxury Hotel Employees at Service Encounter. Seoul National University, Master's Thesis (2016).

5.3. Additional references

[6] http://kostat.go.kr/ (2014).

6. Appendix

6.1. Authors Contribution

	Initial name	Contribution
Lead Author	MK	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Corresponding Author*	EK	-Significant contributions to concepts, designs, practices, analysis and interpretation of data ☑ -Participants in Drafting and Revising Papers ☑ -Someone who can explain all aspects of the paper ☑