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Corresponding author*
E-mail: milee@wu.ac.kr

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Effects of Breast Self-Examination Education on Middle-Aged Women

Soonjung Hwang¹

Vision College of Jeonju, Jeonju, Republic of Korea

Myungin Lee^{2*}

Wonkwang Health Science University, Iksan, Republic of Korea

Abstract

Purpose: The purpose of this study is to identify trends in middle-aged women's knowledge, attitudes, and practices regarding breast self-examination and to enable middle-aged women to perform breast self-examination on their own by providing breast self-examination education.

Method: The subjects were middle-aged women aged between 35 and 60 who were students receiving training at the J City Korean Traditional Music Center. From March 12, 2022, to May 27, 2022, they underwent education on breast cancer and breast self-examination. This is a quasi-experimental design study with a single-group pre-test and post-test, surveying knowledge, attitudes, and practices regarding breast self-examination before and after the education. The collected data was analyzed using SPSS/WIN 22.0.

Results: Regarding breast self-examination knowledge, the average pre-education score was 9.62, and the average post-education score was 11.45. When comparing the level of knowledge before and after the education, the average knowledge score increased by 1.83 points. The average pre-education attitude toward breast self-examination was 40.44 points, and the post-education attitude was 49.12 points, showing an average increase of 8.68 points. Initially, 15 participants performed breast self-examination, with an average pre-education practice score of 9.01. After the education, out of 32 participants, 29 performed the breast self-examination, with a post-education practice score averaging 22.83. The results show that the number of participants who practiced breast self-examination more than doubled when comparing before and after the education.

Conclusion: Breast self-examination education increases the level of breast self-examination practice, which plays a significant role in the early detection of breast cancer by self-administration. Therefore, continuous educational programs should be provided.

Keywords: Middle-Aged Women, Breast Self-Examination, Knowledge, Attitude, Degree of Implementation of Breast Self-Examination

1. Introduction

1.1. Need for the study

Breast cancer is the most common cancer among women in the United States and Europe, and the number of patients in Korean women continues to increase as their lifestyles become westernized along with recent economic growth[1]. In 2022, it will surpass cervical cancer and rank 4th among female cancers (11.1 people/per 100,000 population), accounting for 5.6% of all cancer cases, and those in their 40s have the highest breast cancer mortality rate[1]. Breast cancer is a disease with a rapidly increasing incidence worldwide, with the incidence increasing by 24.3% in 2020 compared to 2012[2]. According to the 2020 International Cancer Report, the incidence of breast cancer is higher the higher the income level, and Korea is classified as a country with a high human development index along with North America and Western Europe,

making it one of the countries with a high cancer incidence [3]. Looking at the age-standardized cancer incidence rate trend surveyed from 2015 to 2019, the annual percentage change rate of each cancer type showed the greatest decrease in liver cancer (-4.3%), and all other carcinomas (colon, stomach cervix) also tended to decrease. However, breast cancer showed an increasing trend (4.3%) [4].

Breast cancer has a high incidence of 75.9% in middle-aged women aged 35 to 60, the most common age group in their 40s, and the incidence and deaths of breast cancer are increasing year by year. In Korea, the frequency of occurrence is in the following order: 40s > 50s > 60s > 30s > 70s, and it also occurs frequently in young women in their 30s and 40s [3]. According to data from the National Cancer Center published in 2023, 277,523 new cases of cancer occurred in Korea in 2021, of which breast cancer (C50) ranked 5th with 28,861 cases in both men and women, or 10.4% of all cancer cases. . The crude incidence rate per 100,000 population (the number of new cases occurring in the target population group during the relevant observation period. The calculation standard is the same for the early mortality rate) is 56.2 cases [4].

Factors causing breast cancer include age, early menstruation, late menopause, women who have never been pregnant or had their first pregnancy after the age of 35, family history, post-menopausal obesity, high economic status, and a history of female reproductive cancer [5]. In addition, risk factors for breast cancer include genetic predisposition, female hormones, drinking, and smoking, but the exact cause has not yet been identified, and as a result, methods to prevent breast cancer have not been clearly identified. Therefore, the best way to reduce the mortality rate due to breast cancer is to detect breast cancer early and treat it early [6].

Early breast cancer screening methods include breast self-examination, breast examination by an expert, mammography, breast ultrasound, breast magnetic resonance imaging, mammography, nipple discharge examination, and biopsy. , it is recommended that all mammograms be performed [7].

Survival rate from breast cancer is inversely correlated with tumor size, and approximately 90% of breast cancers are first discovered accidentally or by self through self-examination [8]. It has been reported that if a woman performs breast self-examination regularly, she can lower the mortality rate from breast cancer by up to 19% [9].

Breast self-examination, first introduced in the 1950s, is the easiest way to detect breast cancer early and is a way for women to increase their sense of responsibility for their own health [10]. It is safe, does not require special equipment, and has the advantage of being a habitual action that is not limited by time and does not require time or cost [11].

Approximately one-sixth of breast cancer patients are discovered between routine breast cancer examinations, demonstrating the need for breast self-examination [3]. Breast self-examination is a step-by-step examination to detect abnormalities in a woman's breasts and involves periodically examining both breasts and armpits every month. In this study, education was provided to the subject group once a week for 3 weeks, a method known to be effective in numerous studies [12]. The educational content includes providing information on breast cancer and methods and procedures for performing breast self-examination [12]. The educational program provided subjects with sensory information through direct or indirect touch through lectures, videos, handouts, and breast models through audiovisual teaching materials (presentations), and included Q&A sessions, and encouraged subject participation [12]. Additionally, it is a program that encourages people to practice breast self-examination [12].

Although they have heard of breast self-examination, they do not know the correct method or practice it regularly, and the problem is that there is a large difference in the practice of breast self-examination by region [13].

In the United States, where breast cancer research is active, studies are being conducted to measure attitudes and beliefs related to breast self-examination in Korea or to identify related factors. Related factors include studies on knowledge, attitude, and practice of breast self-examination[9][14], and studies on the efficiency of self-examination through self-examination education[15]. However, it was not created as standardized data at the national level to identify Korea's national situation or identify related factors, and it was not conducted as a comprehensive review of related or critical factors of breast self-examination. In particular, it is difficult to find studies that have investigated in depth the extent to which specific subjects who come to breast cancer experts for questions and clinical examinations know about and practice breast self-examination, and their attitudes.

According to the American College of Surgeons, the most effective treatment for breast cancer is to detect breast cancer early and receive appropriate treatment to improve survival and prognosis, including breast self-examination. Accordingly, women should receive education on risk factors, early detection, and self-examination for breast cancer[16].

This study aims to prepare basic academic data to promote the practice of breast self-examination by investigating the differences in knowledge, attitude, and implementation level before and after applying breast self-examination education to middle-aged women with a high incidence of breast cancer.

The study holds unique international value due to its culturally specific setting, robust methodology, and significant findings that can be applied to global health initiatives. It provides evidence supporting the implementation of targeted educational programs to improve early detection practices, which is a critical component in the fight against breast cancer worldwide. Thus, the study has the potential to contribute significantly to international discussions and efforts surrounding cancer prevention and early detection, making it a valuable piece of research in the global health community. To thoroughly establish the study's distinctiveness, it would be important to conduct a detailed literature review comparing its findings and methodology with those of previous studies. If not already done in the paper, highlighting these differentiators explicitly in the discussion section would help clarify the unique contributions of this research. By focusing on a specific demographic within a unique cultural context and using a comprehensive and rigorous methodological approach, the study sets itself apart from previous research on breast self-examination education.

2. Purpose of Research

The purpose of this study is to identify trends in middle-aged women's knowledge, attitude, and level of implementation regarding breast self-examination and to provide breast self-examination education so that middle-aged women can practice breast self-examination themselves in the future.

- 1) Determine the subject's knowledge, attitude, and level of implementation regarding breast self-examination and breast cancer before training.
- 2) After training, determine the subject's level of knowledge, attitude, and performance regarding breast self-examination and breast cancer.
- 3) Compare the pre and post breast self-examination education to determine the ranking.

3. Hypothesis of Research

Hypothesis 1. After receiving breast self-examination training, subjects will have higher knowledge scores than before training.

Hypothesis 2. After receiving breast self-examination training, subjects will have higher attitude scores than before training.

Hypothesis 3. After receiving breast self-examination training, subjects will have higher compliance scores than before training.

4. Research Method

4.1. Research design

This is a single-group pre-post quasi-experimental design study conducted to provide breast self-examination education to middle-aged women and to identify changes in knowledge, attitude, and implementation of breast self-examination before and after education.

4.2. Subjects of the study

The subjects of this study were middle-aged women between the ages of 35 and 60 who were receiving training at the J City Gugak Center and who understood the purpose of the study and agreed to participate. The minimum number of study subjects was 27 using the G*Power 3.1 program and a one-sided test using Independent t-test with a medium effect size of .50, significance level (α) .05, and power ($1-\beta$) of .80. In this study, considering the dropout rate of 20%, there were 33 people, but one person dropped out, so 32 people were studied.

The selection and exclusion criteria for subjects are as follows.

In case of selection criteria

- 1) Adults over 18 years of age
- 2) Participants who understand the research purpose and method and agree to participate in voluntary research

In case of excluded person

- 1) Those currently pregnant
- 2) Those currently breastfeeding
- 3) Subjects currently suffering from breast disease
- 4) Subjects with motor and sensory impairment in their hands who have difficulty performing breast self-examination.

4.3. Research tools

4.3.1 General information

The one developed by Choi Gyeong-ok through literature review was used[17]. It consisted of a total of 23 questions, including 6 questions about socio-demographic characteristics, 16 questions about variables related to breast examination, and 1 question about future intentions regarding self-examination.

4.3.2 Knowledge

The knowledge measurement tool developed by Choi Gyeong-ok was used through a literature review[17]. There were 16 questions in total, including 1 question about the prevalence of breast cancer, 1 question about the symptoms of breast cancer, 2 questions about breast cancer risk factors, 1 question about the timing of mammography, 2 questions about the timing of self-examination, 8 questions about the method of self-examination, and 1 question about what to do when a lump is found.

It is a two-choice questionnaire, where 1 point is given for a correct answer and 0 points for an incorrect answer. The score ranges from 0 to 16, with higher scores indicating higher knowledge. In the study by Kyeong-ok Choi[17], the reliability of the tool was .62 as measured by Kuder-Richardson Formulas 20, and in this study, it was .64.

4.3.3 Attitude

The attitude measurement tool was used by Eunju Lee[18], who modified and supplemented the tool based on the tool used by Baekmyeong and Soonhee Choi[19]. This tool consists of 16 questions on a 4-point Likert scale, with each item being 4-point, with 1 being "never true," 2 being "rarely true," 3 being "somewhat true," and 4 being "very much true." It was measured using a scale. It ranges from a minimum of 16 points to a maximum of 64 points. A higher score means a more positive attitude. The reliability of the tool was Cronbach's $\alpha = .59$ in the study by Myeong Baek and Sunhee Choi[19], and Cronbach's $\alpha = .66$ in the study by Eunju Lee[18]. In this study, Cronbach's $\alpha = .64$.

4.3.4 Implementation

The tool for measuring the degree of compliance was used by modifying and supplementing Becker's health belief model with the tool developed by Kim Mi-kyung and Kim Cho-gang to suit the Korean setting[20][21]. There are a total of 9 questions regarding the degree of implementation, measured on a 4-point Likert scale: 4 points for "implemented every month," 3 points for "approximately once every two months," 2 points for "sometimes," and 1 point for "never." It ranges from a minimum of 9 points to a maximum of 38 points, with higher scores indicating a higher degree of implementation. In the study by Mi-kyung Kim and Cho-gang Kim[19], the reliability of the tool was Cronbach's $\alpha = .95$. In this study, Cronbach's $\alpha = .92$.

4. Method of Data Collection

The subjects were students receiving training at the J City Gugak Center, and after seeking permission from the head of the institution in charge, a survey was conducted targeting 32 people. The data collection period was from March 12, 2022 to May 27, 2022, using a questionnaire to investigate using a pre-education breast self-examination knowledge, attitude, and degree of implementation. After the researcher personally provided education on breast cancer and breast self-examination education, breast self-examination training was conducted. Screening knowledge, attitude, and compliance level were investigated using a questionnaire.

5. Method of Data Analysis

SPSS WIN 22.0 was used for data analysis, and the specific analysis method is as follows.

- 1) The frequency and percentage of the subjects' general characteristics were calculated.
- 2) Differences were analyzed using the average of the subject's pre- and post-knowledge, attitude, and implementation level and the Wilcoxon signed Rank Sum test.
- 3) The ranking was obtained by comparing the subjects before and after training.

6. Results

6.1. General characteristics of the study subjects

The general characteristics of the subjects are shown in <Table 1>. Age: 18.87% under 40 years old, 18.75% between 40-45 years old, 47.75% between 45-55 years old, and 18.75% between 55-60 years old. Middle-aged women between 45-55 years old were in the most common age group for breast cancer. Marital status was 40.62% single, 50% married and living with a spouse, and 9.38% widowed. The majority of the subjects were married women living with their spouse.

The economic status was good at 43.75%, fair at 25.00%, and poor at 31.25%. The number of children was 1 at 18.75%, 2 at 62.50%, and 3 at 18.75%, with middle-aged women with 2 children accounting for 62.5% of the total subjects. Looking at the distribution of breast self-examination status, 46.88% said 'I perform breast self-examination' and 53.12% said 'I do not perform breast self-examination.' It was found that more than half of the subjects did not perform self-examination. Among those who answered 'I perform breast self-examination,' 15.63% of women did it regularly and 31.25% of them did it irregularly.

Table 1. General characteristics of the study subjects.

Variable	Category	N	%
Age	40≥	6	18.75
	41-45	6	18.75
	46-55	14	43.75
	56-60	6	18.75
Married	Single	13	40.62
	Married	16	50.00
	Bereavement	3	9.38
Economic status	Good	14	43.75
	Moderate	8	25.00
	Bad	10	31.25
Number of children	1	6	18.75
	2	20	62.50
	3	6	18.75
Breast Self-examination	Yes	15	46.88
	No	17	53.12
Perform breast Self-examination	Irregularly	10	31.25
	Regularly	5	15.63

Note: N=32.

6.2. Knowledge of breast self-examination

The subjects' knowledge about breast self-examination is shown in <Table 2>.

As a result of using Shapiro-Wilk to test the normal distribution, it was found that the prior knowledge score was normally distributed ($p=.165$), but the posterior knowledge score was not normally distributed ($p=.001$). Therefore, the Wilcoxon signed Rank Sum test, a non-parametric test method, was performed to analyze the mean difference in knowledge before and after breast self-examination education. The prior knowledge score about breast self-examination was 9.62 points, and the post-knowledge score was 11.45 points.

When the knowledge score before breast self-examination training is greater than the knowledge score after breast self-examination training (negative rank), the average rank is 6.00

points, and when the knowledge score after breast self-examination is greater than the knowledge before breast self-examination training (positive rank) The average rank was 13.78 points, which showed a statistically significant difference ($Z=-3.629$, $p<.001$).

Since there were more positive ranks than negative ranks, breast self-examination education appeared to be effective in increasing knowledge scores <Table 5>.

Therefore, Hypothesis 1, 'After receiving breast self-examination education, subjects will have higher knowledge scores than before education,' was supported.

Table 2. Knowledge of breast self-examination.

	N	Mean	SD
Pre knowledge score	32	9.62	1.96
Post knowledge score	32	11.45	0.87

Note: N=32.

6.3. Attitude of breast self-examination

The subjects' attitudes toward breast self-examination are shown in <Table 3>.

As a result of using Shapiro-Wilk to test normal distribution, it was found that the pre-attitude score was normally distributed ($p=.800$), but the post-attitude score was not normally distributed ($p=.001$).

Therefore, the Wilcoxon signed Rank Sum test, a non-parametric test method, was performed to analyze the mean difference in attitudes before and after breast self-examination education. The pre-attitude score toward breast self-examination was 40.44 points, and the post-attitude score was 49.12 points.

If the attitude score before breast self-examination education is greater than the attitude score after breast self-examination education (negative rank), the average rank is 6.00 points, and if the attitude score after breast self-examination is greater than the attitude score before breast self-examination education (positive rank))'s average rank was 16.24 points, which showed a statistically significant difference. ($Z=-4.748$, $p<.001$)

Since there were more positive rankings than negative rankings, breast self-examination education appeared to be effective in increasing attitudes <Table 5>.

Therefore, Hypothesis 2, 'After receiving breast self-examination education, subjects will have higher attitude scores than before education,' was supported.

Table 3. Attitude of breast self-examination.

	N	Mean	SD
Pre attitude score	32	40.44	4.32
Post attitude score	32	49.12	4.59

6.4. Degree of implementation of breast self-examination

The subjects' level of compliance with breast self-examination is shown in <Table 4>.

As a result of using Shapiro-Wilk to test normal distribution, it was found that the pre- and post-implementation scores were not normally distributed ($p=.001$).

Therefore, the Wilcoxon signed Rank Sum test, a non-parametric test method, was performed to analyze the mean difference in the degree of compliance before and after breast self-

examination education.

The average pre-compliance with breast self-examination was 9.01 points, and the average post-compliance was 22.83 points. When comparing before and after, the average number of people who practiced breast self-examination more than doubled.

When the compliance score before breast self-examination education is greater than the compliance score after breast self-examination education (negative rank), the average rank is 4.37 points, and when the compliance score after breast self-examination is greater than the compliance score before breast self-examination education, the average rank is 4.37 points. The average rank of (positive rank) was 18.21 points, which showed a statistically significant difference ($Z=-4.623$, $p<.001$).

Since there were more positive ranks than negative ranks, breast self-examination education appeared to be effective in increasing compliance <Table 5>.

Therefore, Hypothesis 3, 'After receiving breast self-examination education, subjects will have higher compliance scores than before education' was supported.

Table 4. Degree of implementation of breast self-examination.

	N	Mean	SD
Pre implementation score	15	9.01	6.83
Post implementation score	29	22.83	7.21

Table 5. Pre and Post training on the subject's breast self-examination.

		N	Average rank	Rank sum
Post knowledge score - Pre knowledge score	Negative rank	4 ^a	6.00	24.00
	Positive rank	20 ^b	13.78	276.00
	Same score	8 ^c		
	Sum	32		
Post attitude score - Pre attitude score	Negative rank	1 ^d	6.00	6.00
	Positive rank	30 ^e	16.24	490.00
	Same score	1 ^f		
	Sum	32		
Post implementation score - Pre implementation score	Negative rank	4 ^g	4.37	17.60
	Positive rank	28 ^h	18.21	510.40
	Same score	0 ⁱ		
	Sum	32		

7. Discussion

The purpose of this study was to identify trends in knowledge, attitudes, and implementation of breast self-examination among middle-aged women, and to provide breast self-examination education so that middle-aged women can practice breast self-examination on their own in the future. In this study, the pre-breast self-examination knowledge score was 9.62 (60.1 on a 100-point scale) and the post-breast self-examination knowledge score was 11.45 (71.6 on a 100-

point scale), which was a statistically significant difference and supported Hypothesis 1, "After receiving breast self-examination education, subjects will have a higher knowledge score than before the education" ($Z=-3.629$, $p<.001$). The knowledge score was lower than the breast self-examination knowledge score of 13.28 in Choi's study[17], which was measured using the same instrument as this study. It was higher than the 2.5 score in a study of female college students[22], and similar to the 11.36 score in a study of obstetric ward nurses[23].

Similar to the results of Yang, Younghee[15], who studied middle-aged women, breast self-examination education significantly increased breast self-examination knowledge. In this study, 14 (47.75%) of the subjects were middle-aged women aged 45-55 years old, and their knowledge of breast self-examination was higher than that of Choi[17], who found that knowledge of breast self-examination is generally higher in the 20s and decreases in the 50s. This study was conducted later than Choi[17], and it is believed that middle-aged women are more interested in breast self-examination due to the higher incidence of breast cancer compared to women in their 20s. Therefore, it is necessary to examine the changes in knowledge scores of breast self-examination education by age group. As higher breast self-examination knowledge scores are associated with higher breast self-examination practices, it is recommended that breast self-examination knowledge should be improved to increase breast self-examination practices. Furthermore, since knowledge gained from breast self-examination education is significantly reduced over time, ongoing breast self-examination education is necessary to maintain knowledge levels[24]. For knowledge, the number of years of breast self-examination education and whether there is a family member with breast cancer are likely to have a significant impact on knowledge scores, and we suggest further research on this topic. In this study, the pre-attitude score for breast self-examination was 40.44 (67.4 on a 100-point scale) and the post-attitude score was 49.12 (81.9 on a 100-point scale), which was a statistically significant difference, and Hypothesis 2, "After receiving breast self-examination education, subjects will have a higher attitude score than before the education," was supported ($Z=-4.748$, $p<.001$). This was found to be high in the study of middle-aged women with a mean score of 3.08 out of 5 (61.6 on a 100-point scale) in Jang, Heejeong, Park, Yoonjung, Oh, Yoonjung, Choi, Eunah, Park, and Chuja[9], and 3.68 (73.6 on a 100-point scale) in Kang, Heeyoung[25], and moderate in the study of female college students with a mean score of 3.68 (73.6 on a 100-point scale) in Jang, Heejeong, Park, Yoonjung, Oh, Yoonjung, Choi, Eunah, Park, and Chuja[9].

This suggests that attitudes toward health are strongly correlated with breast self-examination adherence, and that positive attitudes may be the most important factor in breast self-examination adherence[26][27], which requires ongoing breast self-examination education. Breast self-examination education should be provided continuously, as studies have shown that interest in breast self-examination decreases over time[24], and promotional activities using mass media and social media should be conducted to increase the number of participants. In addition, strategies should be explored to increase the interest and accessibility of the education.

In this study, the mean pre-adherence to breast self-examination was 9.01 and the mean post-adherence was 22.83, indicating that the mean of those who practiced breast self-examination more than doubled. This was statistically significant and supported Hypothesis 3, "After receiving breast self-examination education, participants will have a higher implementation score than before the education" ($Z=-4.623$, $p<.001$).

Breast self-examination education should encourage self-examination as a way to increase sensitivity, informativeness, and self-examination skills, and to increase health awareness[25]. To ensure that breast self-examination is consistently practiced, national education programs, as well as the distribution of pamphlets and leaflets, should be implemented to ensure that women are aware of breast cancer and its early detection.

Breast self-examination education is thought to increase breast self-examination adherence, which in turn plays a major role in early detection of breast cancer through self-examination. Therefore, it is suggested that a retrospective study be conducted to compare the stage of breast cancer at the time of early detection according to the level of breast self-examination.

8. Conclusion and Recommendations

8.1. Conclusion of the study

This is a single-arm pretest-posttest quasi-experimental design study designed to provide breast self-examination education to middle-aged women and to determine the changes in knowledge, attitudes, and implementation of breast self-examination from pre- to post-education.

The subjects of this study were middle-aged women aged 35 to 60 years old who understood the purpose of the study and agreed to participate, and were surveyed using a questionnaire on breast self-examination knowledge, attitudes, and implementation from March 12, 2022 to May 27, 2022, and were surveyed using a questionnaire on breast self-examination knowledge, attitudes, and implementation after receiving education on breast cancer and breast self-examination education.

The data collected was analyzed using SPSS/WIN 22.0.

The results of this study were as follows

1) In terms of breast self-examination knowledge, the pre-knowledge score was 9.62 on average, and the post-knowledge score was 11.45 on average. When comparing the pre- and post-training knowledge, there was an average increase of 1.83 points.

2) The pre-attitude toward breast self-examination was 40.44 on average, and the post-attitude was 49.12 on average, with an average increase of 8.68 points when comparing pre- and post-training.

3) There were 15 participants who practiced breast self-examination, with a mean pre-examination attitude of 9.01. After the training, 29 of the 32 participants performed breast self-examination, with an average post-training score of 22.83. The results show that the number and average of participants who practiced breast self-examination more than doubled from pre- to post-training.

However, this study was limited by the short training period and small number of subjects, and there was no significant difference between the pre- and post-training knowledge of the middle-aged women selected as subjects. The significant improvements in knowledge, attitudes, and practices post-education demonstrate the effectiveness of the intervention. These findings support the implementation of similar educational programs globally, emphasizing the importance of continuous education in promoting health practices. The doubling of participants performing BSE post-education highlights the potential for substantial public health impact.

8.2. Recommendations of the study

The conclusion emphasizes the need for continuous educational programs. This ongoing approach to education might be a point of emphasis that is less pronounced in other studies which might look at one-time interventions.

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10. Appendix

10.1. Author's contribution

	Initial name	Contribution
Lead Author	SH	-Set of concepts <input checked="" type="checkbox"/>
		-Design <input checked="" type="checkbox"/>
		-Getting results <input checked="" type="checkbox"/>
		-Analysis <input checked="" type="checkbox"/>
		-Make a significant contribution to collection <input checked="" type="checkbox"/>
		-Final approval of the paper <input checked="" type="checkbox"/>
Corresponding Author*	ML	-Corresponding <input checked="" type="checkbox"/>
		-Play a decisive role in modification <input checked="" type="checkbox"/>
		-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>
		-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/>
		-Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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A Study on the Suitability of Demand and Supply in Children's Parks by Urban Size

Seokjin Jung¹

Daegu Haany University, Gyeongsan, Republic of Korea

Hyangju Lee^{2*}

Daegu Haany University, Gyeongsan, Republic of Korea

Changjun Kim³

Daegu Haany University, Gyeongsan, Republic of Korea

Jihyun Jung⁴

Daegu Haany University, Gyeongsan, Republic of Korea

Wonhyeon Lim⁵

Daegu Haany University, Gyeongsan, Republic of Korea

Abstract

Purpose: The proportion of elderly people in Korea is expected to increase rapidly every year, making it the country with the fastest-aging population in the world. The 'Ministry of Culture, Sports and Tourism' and the 'Ministry of Health and Welfare' are proposing various policies such as the cultural policy for the elderly and the silver cultural policy. However, they are not meeting rapidly changing social needs. Elderly people prefer outdoor spaces to spend their leisure time more actively rather than indoors, such as existing senior centers or welfare centers.

Method: Cities and provinces across the country were divided into megacities, large cities, medium-sized cities, small cities, and rural-centered cities according to population size. For each city, 10 cities and counties were selected as target sites, and data on population status by city and year and the area and quantity of living area parks were organized. Using the surveyed data, researchers conducted user demand analysis and supply adequacy analysis by city. Statistical analysis was performed using multivariate analysis of variance (MANOVA) and the Spss Statistics 21 statistical program was used.

Results: As a result of analyzing the difference between the ratio of children and the elderly by city size, the ratio of children is decreasing in small cities and rural centers due to low birth rates and aging, while the ratio of elderly people continues to increase. The adequacy evaluation index of supply and demand for children's parks according to city size was found to be high in big cities. The evaluation index of park supply adequacy for the elderly was found to be high in rural central cities.

Conclusion: In modern society, which has entered an aging society, in order to solve the problem of the elderly, a plan is needed to convert underutilized children's parks in small cities or central rural cities into rest and exercise spaces for the elderly. The existing children's park is located in a residential area where anyone can access it, so it is not only highly accessible for the elderly but can also improve the aesthetics of the city through redevelopment and rebuilding.

Keywords: Children's Park, Living Area Park, Elderly Population, Aging, Complex Cultural Space

1. Introduction

The United Nations defines people over 65 as elderly. A society where the elderly population accounts for more than 7% of the total population is classified as an 'aging society', a society where the proportion of the elderly population is more than 14% is classified as an 'aged society', and a society where the elderly population accounts for more than 20% is classified as an 'ultra-aged society'[1]. In the case of Korea, the elderly population ratio was 14.3% in 2017, entering an 'aged society'[2].

*This paper summarizes Seokjin Jung's Daegu Haany University Doctoral Thesis.

The aging index in 2022 was 17.6%, making it an 'aged society', and it is expected to enter a 'ultra-aged society' in 2026[3].

Small cities and rural central cities are increasingly becoming aging societies, with the child population decreasing and the elderly population increasing due to low birth rates[4]. Due to the low birth rate, it is difficult to find children in existing children's parks, and the facilities are unused and neglected[5][6].

The 'Ministry of Culture, Sports and Tourism' and the 'Ministry of Health and Welfare' are proposing various cultural policies for the elderly, but they are not meeting rapidly changing social needs[7]. As we enter the aging era, the desires and needs for the health and quality of life of the elderly are increasing[8][9]. Elderly people prefer outdoor spaces to spend more active leisure time rather than spending their leisure time indoors such as existing senior centers or welfare centers[10].

The current children's park is recognized as a park only for children, and is limited to simply arranging play facilities, exercise facilities, and rest facilities without considering the location characteristics of the children's park and the age characteristics of surrounding users[6][11].

When developing a new type of park, there are many difficulties in incorporating a unique park plan and the creative thoughts of the park designer[12].

Budget is a difficult issue, but one of the more important issues is that it involves passive park planning to resolve residents' complaints. Children's parks need to be supplemented with facilities with various functions so that they can be used as a play space for children, who are the main users, as well as a space for exercise, rest, and recreation for the elderly[13][14].

If various programs are developed to increase park utilization, local children's parks can be used as a community place for residents as well as a space for exercise, rest, and recreation for the health of the elderly[15].

2. Prior Research

The children's park is located closest to residential areas among residential parks, so it is easily accessible. Children's parks are the parks most closely related to the lives of residents and can be easily used by children and various classes of people[4][16]. As the child population has decreased, the current children's park is not only a park used as a play space for children but is also an optimal park used as a space for residents to exercise and relax[17].

In his basic research on planning and revitalizing senior parks, Chae SD(2014) proposed a plan for a senior-friendly park that considers the senior generation in terms of location, facility and spatial arrangement, and program revitalization[18][19]. In a study on the physical environment evaluation system of senior parks, Lim GH (2014) identified the physical environment of parks exclusively for senior citizens and awareness surveys of senior parks and presented basic data for future senior park plans[20][21].

Choi MK (2015) conducted a study on the creation of a mixed-use park using a children's park as a solution to the leisure problem of the elderly in a study on the elderly's mixed use of children's parks and facility preferences. In a study on improving the neighborhood environment to promote the outdoor activities of the elderly, Koo JH (2016) examined the outdoor activities of the elderly in the neighborhood environment and proposed a plan to improve the neighborhood environment to promote the outdoor activities of the elderly in Namsu-dong, Paldal-gu, Suwon[22][23].

In a study on the development of a multi-purpose children's park model, Lee DH (2017) suggested the direction of developing a multi-purpose children's park model to solve the decline in the use of children's parks due to aging and low birth rate and the leisure problems of the elderly[24]. In a study on the distributive equity of urban parks, Jeong JH (2017) presented a realistic proposal for urban park services to realize distributive equity by considering the local population and users at the administrative district level[25][26]. Go MJ (2019), in a study on ways to introduce a playground for the elderly in the era of active seniors, suggested the necessity of introducing a playground for the elderly that reflects the characteristics of the region and a plan for creating a playground for the elderly[2][27]. In a study on the construction status and spatial composition analysis of senior-friendly parks, Lee SA (2021) presented basic data that serve as the basis for spatial composition and facility planning required when creating a new senior-friendly park[19][28][29].

Kim HJ et al. (2011) presented a direction for assessing the feasibility of location in areas where additional urban parks are expected to be built in an assessment of supply adequacy through spatial imbalance analysis of urban parks, providing basic data for establishing spatial plans for future sustainable development of cities[30][31][32][33].

Research on how to utilize parks in an era of low birth rates and aging is being conducted in various fields. However, there is a lack of prior research conducted on the topic of converting existing children's parks into complex cultural spaces targeting the elderly by comparing and analyzing the child population and the elderly population among the population composition ratio.

3. Methods

3.1. Research scope

As for the spatial scope, as shown in <Table 1>, Korean cities were organized in order of population by size, and 50 cities were selected as research target cities using simple random sampling. The cities studied were divided into megacities, big cities, medium cities, small cities, and rural central cities, as argued by Lee JL (2001) and Jeon WJ (2016). For each city, 10 cities and counties were selected as target sites, and the total population, child population ratio, and elderly population ratio for each city were investigated. The status of parks by city was investigated by using the statistical yearbook of the National Urban Park Information Standard data and the construction area and park designation status of living area parks (small parks, children's parks, and neighborhood parks) in each city.

Table 1. Cities classified according to population size.

Division	Number of people	Sample city	Note
Megacity	Over 1 million (11 locations)	Seongdong-gu, Seoul. Gangnam-gu, Seoul. Geumjeong-gu, Busan. Yeonsu-gu, Incheon. Suseong-gu, Daegu. Dalseo-gu, Daegu. Dalseong-gun, Daegu. Yuseong-gu, Daejeon. Nam-gu, Gwangju. Nam-gu, Ulsan.	10 cities
Big city	500,000~1 million (12 locations)	Seongnam-si, Gyeonggi-do. Chungju-si, North Chungcheong-do. Bucheon-si, Gyeonggi-do. Hwaseong-si, Gyeonggi-do. Namyangju-si, Gyeonggi-do. Ansan-si, Gyeonggi-do. Jeonju-si, Jeollabuk-do. Cheonan-si, South Chungcheong. Gimhae-si, Gyeongnam-do. Pohang-si, Gyeongbuk.	10 cities

Medium city	200,000~500,000 (29 locations)	Gumi-si, Gyeongbuk. Yangsan-si, Gyeongnam. Wonju-si, Gangwon-do. Asan-si, Chungnam. Iksan-si, Jeollabuk-do. Gyeongsan-si, Gyeongbuk. Hanam-si, Gyeonggi-do. Yeosu-si, Jeollanam-do. Gyeongju-si, Gyeongbuk. Chungju-si, North Chungcheong.	10 cities
Small city	50,000 ~ 200,000 (56 locations)	Guri-si, Gyeonggi-do. Seosan-si, Chungcheongnam-do. Andong-si, Gyeongbuk. Gwangyang-si, Jeollanam-do. Jecheon-si, Chungcheongbuk-do. Chilgok-gun, Gyeongbuk. Jeongeup-si, Jeollabuk-do. Miryang-si, Gyeongnam. Donghae-si, Gangwon-do. Mungyeong-si, Gyeongbuk.	10 cities
Rural central city	Less than 50,000 (54 locations)	Seongju-gun, Gyeongbuk. Taebaek-si, Gangwon-do. Yeoncheon-gun, Gyeonggi-do. Namhae-gun, Gyeongnam. Gyeryong-si, South Chungcheong. Cheongdo-gun, Gyeongbuk. Hampyeong-gun, Jeollanam-do. Boeun-gun, North Chungcheong. Yangyang-gun, Gangwon-do. Muju-gun, Jeollabuk-do.	10 cities

Note: Statistics Korea, 「population survey」 2021, reorganized by researchers.

3.2. Data analysis

The standard population was determined by investigating, comparing, and analyzing the proportion of the child population under 14 years of age and the proportion of the elderly population over 65 years of age for each target city. In order to analyze the number of potential users of children's parks in each target city, changes in the child population ratio and elderly population ratio were analyzed. Multivariate analysis of variance (MANOVA) was performed to determine differences through a year-by-year effect test in the proportion of children and the elderly. As a way to find ways to utilize children's parks, the adequacy of supply was analyzed by comparing the supply adequacy evaluation index to the child population by city size and the supply adequacy evaluation index to the elderly population by city size. In previous studies, the legal requirement was used by multiplying the urban park supply area of 6 m² per person, which is the urban park supply area stipulated by law, by the population for each unit of analysis. In this study, the park area per person was calculated as 6 m² based on the total population. The per capita area used in the calculation of the legal requirements applied to the child population and the elderly population was set at a minimum area of 9 m². In Landscape Planning Theory (1994), the area per person determined in calculating the appropriate size of a children's park is set at 9 to 14 m².

The formula for the child population is as follows:

$$\{(\text{Amount provided by park} - \text{Legal requirement for children}) / \text{Legal requirement for children}\} \times 100 \text{----- (Equation 1)}$$

The formula for the elderly population is as follows.

$$\{(\text{Amount provided by park} - \text{Legal requirement for senior citizens}) / \text{Legal requirement for senior citizens}\} \times 100 \text{----- (Equation 2)}$$

The park provision amount used in the calculation of the supply adequacy assessment was based on the actual area of the living area park and children's park created in each city.

The analysis results of the children's park supply adequacy evaluation index were interpreted referring to the contents of <Table 2>.

Table 2. Supply adequacy evaluation criteria (rewritten by the researcher).

Division	Evaluation index (%)	Contents of park adequacy evaluation
1	Over 50	very sufficient place
2	20 ~ 50	enough place
3	0 ~ 20	a little bit enough
4	-20 ~ 0	a little lacking
5	-50 ~ -20	Lacking place
6	Below -50	very lacking place

Note: Lee GJ & Lim ES, summary written by researchers (2009).

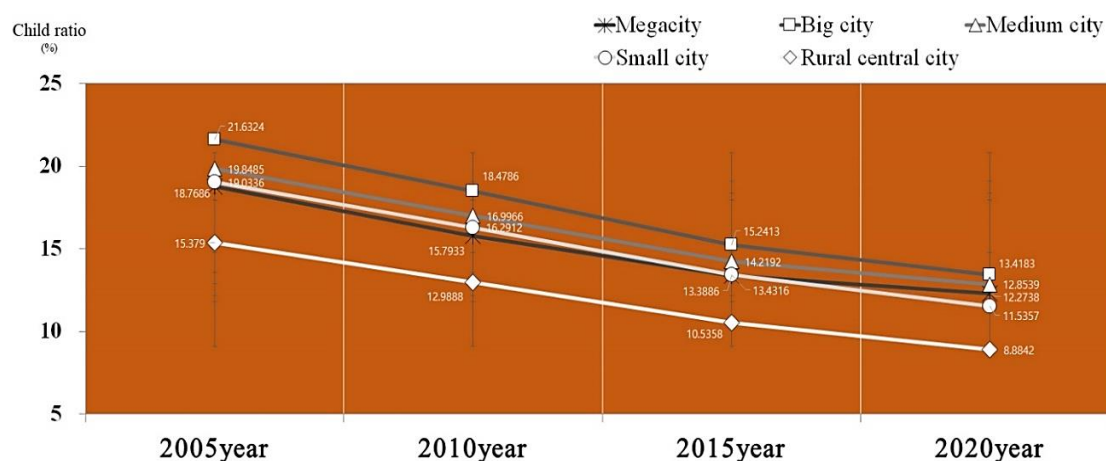
4. Results & Discussion

4.1. Demand analysis for user

As a result of analyzing changes in the overall population composition, which is the number of potential users of children's parks, the ratio of children by year by city size is shown in <Table 3> and <Figure 1>. In 2005, the child ratio was highest in big cities at 21.6324%, and lowest in rural central cities at 15.3790%. In 2010, big cities had the highest rate at 18.4786%, and rural central cities had the lowest rate at 12.9888%. In 2015, big cities had the highest rate at 15.2413%, and rural central cities had the lowest rate at 10.5358%. In 2020, big cities showed the highest rate at 13.4183%, and rural central cities showed the lowest rate at 8.8842%.

Table 3. Proportion of children by year by city size.

Year	Survey index	Megacity	Big city	Medium city	Small city	Rural central city
2005year	10	18.7686	21.6324	19.8485	19.0336	15.3790
2010 year	10	15.7933	18.4786	16.9966	16.2912	12.9888
2015 year	10	13.3886	15.2413	14.2192	13.4316	10.5358
2020 year	10	12.2738	13.4183	12.8539	11.5357	8.8842
Sum/Average	40	15.0561	17.1927	15.9796	15.0730	11.9470

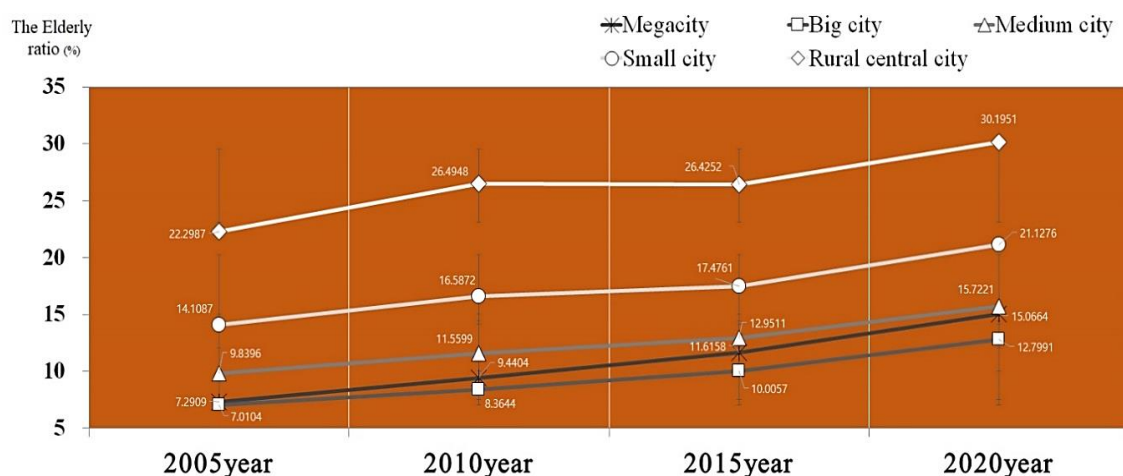
Figure 1. Comparison chart of child ratio by city size.

The proportion of elderly people by year by city size is shown in <Table 4> and <Figure 2>. In 2005, the elderly ratio was highest in rural central cities at 22.2987% and lowest in small cities at 7.0104%. In 2010, the elderly ratio was highest in rural central cities at 26.4848%, and lowest in big cities at 8.3644%. In 2015, it was highest at 26.4252% in rural-centered cities and lowest at 10.0057% in big cities. In 2020, it was highest at 30.1951% in rural central cities, and lowest at 12.79912% in big cities.

Table 4. Proportion of elderly people by year by city size.

Year	Survey index	Megacity	Big city	Medium city	Small city	Rural central city
2005 year	10	7.2909	7.0104	9.8396	14.1087	22.2987
2010 year	10	9.4404	8.3644	11.5599	16.5872	26.4948
2015 year	10	11.6158	10.0057	12.9511	17.4761	26.4252
2020 year	10	15.0664	12.7991	15.7221	21.1276	30.1951
Sum/Average	40	10.8534	9.5449	12.5182	17.3249	26.3534

Figure 2. Comparison chart of the proportion of elderly people by city size.



As a result of analyzing the difference between the ratio of children and the elderly by city size, the ratio of children decreased, and the ratio of the elderly continued to increase due to low birth rates and aging in small cities and rural central cities. In the case of areas with a relatively large proportion of children, efforts are needed to create specialized parks for children. In the case of small cities or rural central cities with a relatively large elderly population, efforts are needed to create specialized parks for the elderly[34][35][36].

Based on the analysis, to efficiently apply the park utilization plan for each city size, it is necessary to find ways to utilize the underutilized children's park, such as converting it into a complex cultural space for the elderly.

Even if the current park system is maintained in the living area parks of megacities, big cities, and medium cities, the park system must be converted to focus on small cities and rural central cities where the ratio of children is decreasing and the ratio of the elderly is increasing.

4.2. Supply adequacy analysis

The park supply adequacy evaluation index targeting the child population is shown in <Table 5>. In 2005, the evaluation index was found to be very insufficient in big cities, at -78.4797. The

evaluation index in big cities was very insufficient at -65.4466, in medium cities it was very insufficient at -61.7104, in small cities it was very insufficient at -57.6191, and in rural central cities it was very insufficient at -65.2442. In 2010, the evaluation index was found to be very insufficient at -67.6560 in megacities, -65.1493 in big cities, and -50.0468 in medium cities. It was found to be insufficient at -42.6823 in small cities and -40.4703 in rural central cities. In 2015, the evaluation index was found to be very insufficient at -63.5028 in large cities and -58.0375 in big cities.

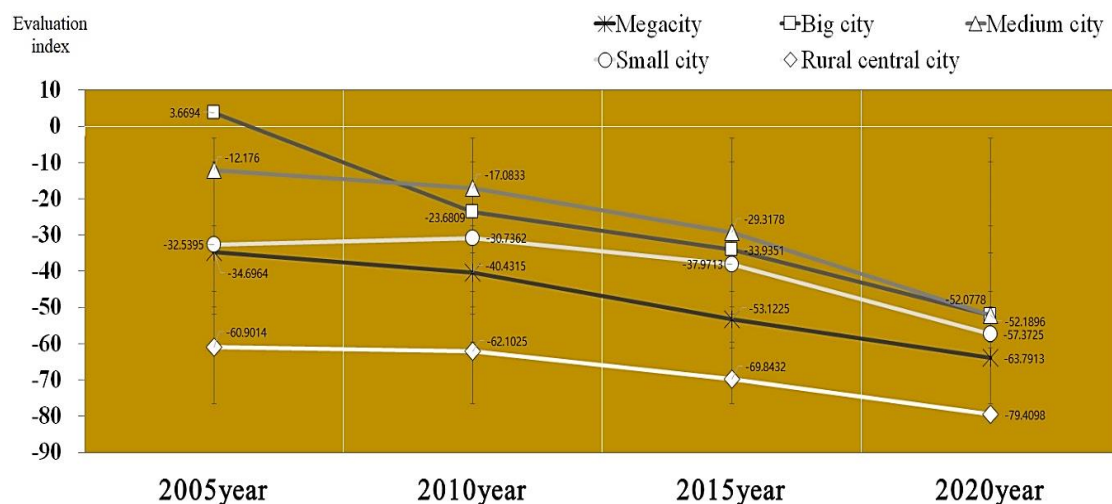
It was found to be insufficient at -41.5717 in medium cities, -31.3667 in small cities, and -32.0115 in rural central cities. In 2020, the evaluation index was found to be very insufficient at -59.3551 in megacities and -54.8229 in big cities. It was found to be insufficient at -45.9781 in medium cities, -32.2686 in small cities, and -32.2686 in rural central cities.

Table 5. Comparison table of child supply adequacy evaluation index between years by city size.

Year	Survey index	Megacity	Big city	Medium city	Small city	Rural central city
2005 year	10	-78.4797	-65.4466	-61.7104	-57.6191	-65.2442
2010 year	10	-67.6560	-65.1493	-50.0486	-42.6823	-40.4703
2015 year	10	-63.5028	-58.0375	-41.5717	-31.3667	-32.0115
2020 year	10	-59.3551	-54.8229	-45.9781	-31.4676	-32.2686
Sum/Average	40	-67.2484	-60.8641	-49.8272	-40.7839	-42.4986

A graph showing the park supply adequacy evaluation index based on the child population by city size and year is shown in <Figure 3>. As shown in the graph, it can be seen that the supply adequacy evaluation index of parks targeting children increases every year by city size. This means that the child population is decreasing in each city every year.

Figure 3. Comparison chart of supply adequacy evaluation index of parks targeting children population.



The park supply adequacy evaluation index targeting the elderly population as a comparison group for the child population is shown in <Table 6>.

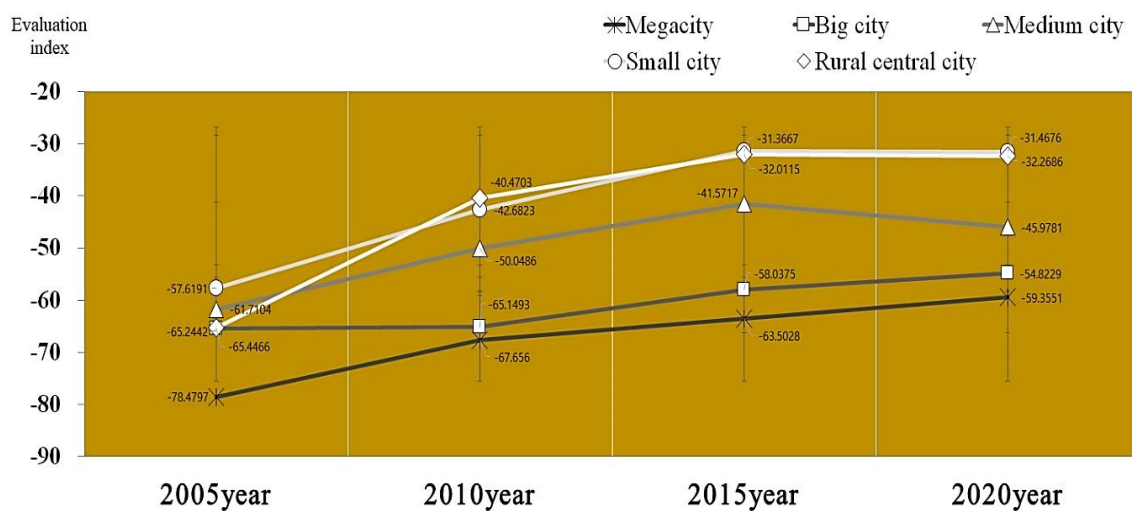
In 2020, the evaluation index was found to be very insufficient in all cities. Especially in rural-central cities, the evaluation index was found to increase every year from 2005 (-60.9014), 2010 (-62.1025), 2015 (-69.8432), and 2020 (-79.4098).

Table 6. Comparison table of senior citizen supply adequacy evaluation index by year by city size.

Year	Survey index	Megacity	Big city	Medium city	Small city	Rural central city
2005 year	10	-34.6964	3.6694	-12.1760	-32.5395	-60.9014
2010 year	10	-40.4315	-23.6809	-17.0833	-30.7362	-62.1025
2015 year	10	-53.1225	-33.9351	-29.3178	-37.9713	-69.8432
2020 year	10	-63.7913	-52.0778	-52.1896	-57.3725	-79.4098
Sum/Average	40	-48.0104	-26.5061	-27.6917	-39.6549	-68.0642

<Figure 4> shows the park supply adequacy evaluation index for the elderly population by city size and year. As shown in the graph, it can be seen that the supply adequacy evaluation index of parks targeting the elderly by city size is decreasing every year. This means that the elderly population is increasing in each city every year.

Figure 4. Comparison chart of supply adequacy evaluation index of parks targeting the elderly population.



5. Conclusion

Children's parks in small cities and rural central cities require changes to the park system. In small cities or rural central cities where the child population is decreasing and the elderly population is increasing, existing children's parks that are underutilized should be explored for ways to utilize them, such as converting them into complex cultural spaces targeting the surrounding elderly. The complex cultural space is a place where people from various classes can engage in cultural activities such as exercise and relaxation, using the existing children's park. Local children's parks can be used for the health of the elderly as well as community spaces for local residents. In the future, local children's parks will need to supplement various facilities and develop programs so that they can be used not only as play spaces for children, who are the main users, but also as spaces for exercise, rest, and recreation for the elderly.

If the children's park, which has excellent accessibility from residential areas but is old and neglected due to the decline in the number of children, is used as a complex cultural space for the elderly, it will play a sufficient role in supporting outdoor activity spaces for the elderly.

If a children's park is rebuilt and redeveloped into a senior park, it will contribute to improving the urban aesthetic of the area.

There are still no regulations for senior citizens' parks in Korea's urban parks and green space laws. Through this study, researchers hope that it will be used as data necessary to legally propose the establishment of a senior citizen's park and to reorganize and redevelop underutilized children's parks into senior citizens' parks through the revision of local laws and regulations by local governments.

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7. Appendix

7.1. Authors contribution

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

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Corresponding author*
E-mail: choijin5@changwon.ac.kr

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The Impacts of Inattention & Hyperactivity/Impulsivity Tendencies and Peer Relationship on School Bullying Victimization in Elementary School Students

Jinoh Choi

Changwon National University, Changwon, Republic of Korea

Abstract

Purpose: The purpose of this study was to investigate how inattention & hyperactivity/impulsivity tendencies, and peer relationships among elementary school students interact and influence school bullying victimization.

Method: This study involved 395 students from grades 4 to 6 in elementary schools located in the capital area. The participants were surveyed on inattention & hyperactivity/impulsivity tendencies, negative peer relationships, and levels of school bullying victimization. The collected data were analyzed using multiple regression analysis and structural equation modeling.

Results: The results of the analysis were as follows. Firstly, inattention, hyperactivity/impulsivity, and negative peer relationships in elementary school students were found to increase school bullying victimization. Secondly, these factors were found to interact with each other, further increasing the likelihood of school bullying victimization. Specifically, the following three pathways were identified as significant: 'hyperactivity/impulsivity → inattention → school bullying victimization', 'hyperactivity/impulsivity → negative peer relationship → school bullying victimization', and 'negative peer relationship → inattention → school bullying victimization'.

Conclusion: These findings of this study provide new insights for developing effective programs and policies aimed at preventing and addressing school bullying among elementary school students, a growing societal concern.

Keywords: Inattention, Hyperactivity, Impulsivity, Peer Relationship, School Bullying

1. Introduction

School bullying is a critical issue that infringes upon the fundamental right of students to be respected and to receive education as human beings. In South Korea, the Ministry of Education has long been at the forefront of efforts to eradicate school bullying. Currently, the Ministry is implementing the 4th Comprehensive Plan for School bullying Prevention and Measures (2020-2024)[1]. This plan envisions "A happy school created by all" and aims to cultivate "A school culture full of respect and consideration, schools trusted through active protection and education, and homes and communities that support the growth of democratic citizens." To achieve these goals, the plan focuses on five key tasks: ① strengthening school bullying prevention through the enhancement of school community capabilities, ② reinforcing fair and educational responses to school bullying, ③ enhancing protection and healing systems for victimized students, ④ strengthening education and guidance for perpetrators, and ⑤ establishing a comprehensive ecosystem for the prevention and response to school bullying across society.

Despite these efforts by the Ministry of Education, the problem of school bullying persists, becoming more sophisticated, and the age of both perpetrators and victims continues to decrease. According to the Ministry's 2023 survey on school bullying, the proportion of victimized

students was 1.9%, an increase of over 10% compared to the same period in the previous year. Notably, there is an alarming trend of younger victims[2]. The proportion of elementary school students among the victims increased to 2.2% in 2023 from 1.3% in 2022, a rise of over 40%. In response to this increase, the Ministry of Education announced the '2023 Comprehensive Plans to Eradicate School bullying,' which includes stricter penalties for perpetrators[3]. However, many educational stakeholders have expressed skepticism regarding the effectiveness of these plans.

The impact of school bullying on victimized students is profound. Victimized students experience psychological issues such as depression, anxiety, and post-traumatic stress disorder[4]. They may also exhibit physical symptoms such as insomnia, gastrointestinal disorders, and panic symptoms[5]. School bullying negatively affects their school life and academic performance, as well as their peer relationships[6]. In severe cases, school bullying can lead to extreme behaviors such as suicidal thoughts or impulses[7].

Given the severe consequences of school bullying, it is crucial to prioritize its prevention before it occurs. To effectively prevent and address school bullying, it is necessary to examine the factors that influence its occurrence and to understand the specific pathways through which these factors contribute to school bullying. In this context, previous studies highlighting the simultaneous influence of social characteristics such as peer relationships and individual traits such as ADHD tendencies on the occurrence of school bullying are noteworthy.

Previous research consistently shows that positive peer relationships are effective in preventing school bullying, while negative peer relationships can exacerbate it[8][9]. Additionally, ADHD tendencies, such as inattention and hyperactivity/impulsivity, negatively impact both victims and perpetrators of school bullying[10][11][12]. Specifically, these tendencies are closely associated with school bullying perpetration in boys and victimization in girls[13][14]. Additionally, prior studies have demonstrated a close association between peer relationships and ADHD or ADHD tendencies[15][16][17].

These studies are significant in demonstrating the importance of peer relationships and ADHD tendencies, including inattention and hyperactivity/impulsivity, on school bullying. However, they fall short in illustrating the structural relationships through which these factors organically influence school bullying. Particularly, there is a clear limitation in not examining how inattention and hyperactivity/impulsivity, as aspects of ADHD tendencies, individually affect school bullying. Therefore, this study aims to explore the structural pathways through which peer relationships, inattention, and hyperactivity/impulsivity influence school bullying. The specific research questions are as follows:

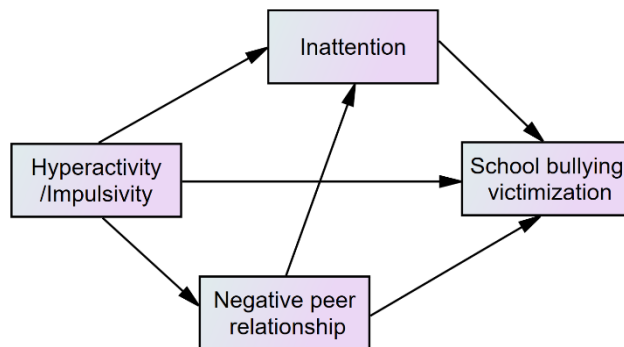
- 1) How do inattention, hyperactivity/impulsivity, and negative peer relationships among elementary school students influence school bullying?
- 2) Through what structural pathways do inattention, hyperactivity/impulsivity, and negative peer relationships among elementary school students influence school bullying?

2. Research Method

2.1. Hypothetical model

Based on the analysis of previous studies, this research establishes the structural relationships between Inattention(IA), hyperactivity/impulsivity(HI), negative peer relationships(NPR), and school bullying victimization(SBV) as depicted in <Figure 1>. In this study, the research model was established as a saturated model; therefore, no separate model fit indices were assessed.

Figure 1. Hypothetical model.



2.2. Research subject

A total of 395 students in grades 4 to 6 from elementary schools located in the capital area participated in this study. The data collection process was as follows: First, a school was selected through convenience sampling, and the researcher explained the study's content. Second, questionnaires were mailed to the selected elementary school based on the number of students in grades 4 to 6 who agreed to participate. Third, homeroom teachers distributed the questionnaires to the students, who completed and returned them. The collected questionnaires were then mailed back to the researcher. The gender and grade distribution of the participating students are shown in <Table 1>.

Table 1. Characteristics of the participants.

Characteristic	Classification	Frequency (N)	Ratio (%)
Gender	Male	216	54.7
	Female	177	44.8
	Non-responsive	2	.5
Grade year	4	134	33.9
	5	123	31.1
	6	134	33.9
	Non-responsive	4	1.0

2.3. Measurement tools

2.3.1. Inattention(IA) & hyperactivity/impulsivity(HI)

In order to measure inattention and hyperactivity/impulsivity of the participants, ADHD Tendencies Measurement Tool developed by Choi[18]. This scale consists of 18 items divided into two domains: inattention and hyperactivity/impulsivity. The internal reliability for each domain, as observed in this study, were .844 for inattention and .811 for hyperactivity/impulsivity.

2.3.2. Negative peer relationship

To measure negative peer relationships, this study adapted and modified the positive peer relationship and mutual cooperation items from Lee, Shin, and Kang to better suit the context of this research[19]. The scale consists of 5 items, presented on a 4-point Likert scale. The items are reverse-scored, so higher total scores indicate more negative peer relationships. The internal reliability of the scale in the current study was .784.

2.3.3. School bullying victimization

In this study, the level of school bullying victimization was measured using survey items modified by Choi from the Ministry of Education's school bullying victimization survey[20]. These items were transformed into sentence forms that are easier for elementary school students to understand. The school bullying victimization scale comprises a total of 7 items and utilizes a 4-point Likert scale for self-assessment. The internal reliability of the scale, as observed in this study, was .687.

2.4. Data analysis

The analysis of the research data was conducted through the following procedures. First, multiple regression analysis was performed to examine the effects of the independent variables on the dependent variable. Second, descriptive statistics and correlation analysis were conducted to check the normality assumptions and multicollinearity issues of the measured variables. Third, the significance of each path was verified to understand the influence of the measured variables. Fourth, the significance of the total effects, direct effects, and indirect effects among the measured variables was confirmed through effect decomposition. Fifth, path analysis was conducted to determine how inattention, hyperactivity/impulsivity, and negative peer relationships influence school bullying victimization.

3. Research Results

3.1. Multiple regression analysis

To begin with, multiple regression analysis was conducted to examine the impact of inattention(IA), hyperactivity/impulsivity(HI), and negative peer relationships(NPR) on school bullying victimization(SBV). As shown in <Table 2>, all independent variables were found to have significant effects on the dependent variable. These results indicate that IA, HI, and NPR all contribute to an increase in SBV.

Table 2. Result of multiple regression analysis.

I.V	D.V	β	<i>t</i>
IA	SBV	.197	3.201***
HI		.156	2.555**
NPR		.176	3.715***

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

3.2. Correlation and descriptive analysis

A correlation analysis was performed among the measured variables. As shown in <Table 3>, all measured variables exhibited positive correlations with each other, with absolute values ranging from .146 to .647, indicating that multicollinearity is not a significant issue. Next, the normality assumption of the measured variables was examined through descriptive statistics and all the values of skewness and kurtosis were acceptable thresholds.

Table 3. Descriptive statistics and correlations of the measurement variables.

	IA	HI	NPR	SBV
HI	.647**			
NPR	.204**	.146**		

SBV	.334**	.309**	.239**	
M	1.859	1.718	1.799	1.220
SD	.519	.445	.680	.293
Skewness	.230	.265	.829	1.770
Kurtosis	-.604	-.578	.258	3.453

Note: **p<.01.

3.3. Path analysis

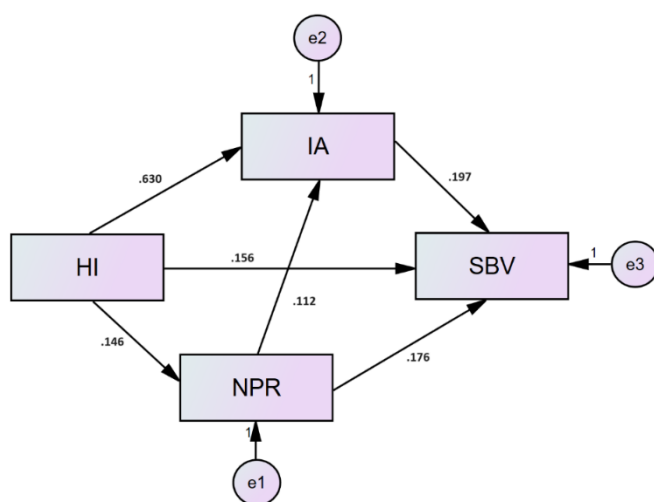
Path analysis was conducted to confirm the significance of the pathways among HI, NPR, IA, and SBV. As shown in <Table 4>, all pathways between the variables were significant. Specifically, an increase in hyperactivity/impulsivity in elementary students leads to an increase in negative peer relationships, a higher level of inattention, and a greater likelihood of experiencing school bullying victimization. An increase in negative peer relationships also leads to a higher level of inattention and a greater likelihood of experiencing school bullying victimization. Additionally, higher levels of inattention are associated with an increased likelihood of experiencing school bullying victimization. The specific standardized coefficients among HI, NPR, IA, and SBV are illustrated in <Figure 2>.

Table 4. Analysis of path coefficients between variables.

Pathway	Non-standardized coefficient	Standardized coefficient	Standard error	t
HI → NPR	.025	.146	.008	2.936**
HI → IA	.736	.630	.045	16.400***
HI → SBV	.011	.156	.004	2.565**
NPR → IA	.771	.112	.264	2.919***
NPR → SBV	.076	.176	.020	3.729***
IA → SBV	.12	.197	.004	3.213***

Note: ***p<.001.

Figure 2. Standardized regression weight between the variables.



3.4. Effect decomposition

Next, an effect decomposition was conducted to examine the direct, indirect, and total effects among HI, NPR, IA, and SBV. It was confirmed that all values were significant, as 0 was not included between the minimum and maximum values of the confidence intervals. As shown in <Table 5>, HI has a significant direct effect on NPR, both direct and indirect effects on IA, and a significant indirect effect on SBV. Additionally, NPR has a significant direct effect on IA and both direct and indirect effects on SBV, while IA has a significant direct effect on SBV.

Table 5. Results of the effect decomposition.

Pathway	Direct effect	Indirect effect	Total effect
HI → NPR	.146*	-	.146*
HI → IA	.630*	.017*	.647*
HI → SBV	.156*	.453*	.309*
NPR → IA	.112*	-	.112*
NPR → SBV	.176*	.022*	.198**
IA → SBV	.197*	-	.197*

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

3.5. Analysis of mediating effects

Given that HI and NPR were found to increase SBV both directly and indirectly, the significance of each pathway through which these effects occur was verified. For the path analysis, phantom variables were used to represent the pathways from HI and NPR to SBV, and bootstrapping was conducted to confirm their significance. As shown in <Table 6>, three pathways were found to be significant: 'HI → NPR → SBV', 'HI → IA → SBV', and 'NPR → IA → SBV'.

Table 6. Mediating effects between variables.

Pathway	Estimate	SD	p	95% Confidence Interval (Lower Bounds, Upper Bounds)
HI → NPR → SBV	.009	.004	.026	(.003, .015)
HI → IA → SBV	.002	.001	.020	(.001, .003)
NPR → IA → SBV	.010	.005	.020	(.002, .020)

4. Discussion

4.1. The impact of inattention on school bullying victimization

According to the analysis results, inattention tendencies were found to increase school bullying victimization. These findings align with previous studies that indicate ADHD or ADHD tendencies can increase the risk of school bullying victimization[10][11]. The following explanations can be provided for why inattention tendencies in elementary students increase the risk of school bullying victimization.

Firstly, inattention tendencies may reduce self-advocacy and self-care abilities, thereby increasing the likelihood of school bullying victimization. Self-advocacy and self-care abilities refer to the capacity to protect oneself in problematic situations[21]. These abilities are crucial protective factors that can lower the likelihood of school bullying occurrence. Effective self-

advocacy and self-care require accurate situational awareness and the development of appropriate coping strategies. However, students with inattention tendencies are likely to struggle with situational awareness and coping strategy development, making them less able to effectively manage school bullying situations, thereby increasing their risk of ongoing victimization. Research indicates that students with ADHD tendencies generally have lower self-advocacy and self-care abilities compared to their peers, supporting this hypothesis[22].

Secondly, school maladjustment issues caused by inattention tendencies can also increase the risk of school bullying victimization. A prominent issue stemming from inattention tendencies in school life is academic underachievement. In the context of the Korean education system, where students are required to sit still and follow classroom instructions, inattention tendencies poses a significant obstacle to keeping up with lessons. When students are unable to follow lessons, they naturally lose interest in academics, leading to academic underachievement. Accumulated academic underachievement results in a general disinterest in school life, which easily leads to school maladjustment. Students exhibiting school maladjustment symptoms are more likely to become targets of school bullying by their peers. Previous studies have shown that ADHD students have higher levels of school maladjustment compared to their peers and that maladjusted students are more likely to be victims of school bullying, supporting this explanation[23][24].

4.2. The impact of hyperactivity/impulsivity on school bullying victimization

The analysis results indicate that hyperactivity/impulsivity tendencies increase the likelihood of school bullying victimization. These findings are consistent with previous research showing that ADHD or ADHD tendencies can elevate the risk of school bullying[10][11]. The following explanations can be provided for why hyperactivity/impulsivity tendencies in elementary students increase the risk of school bullying victimization.

Firstly, aggressive behavior resulting from hyperactivity/impulsivity may increase the likelihood of school bullying victimization. Students with high levels of hyperactivity/impulsivity often struggle to appropriately manage conflicts with their peers and may frequently respond with aggressive behavior. Peers who experience these aggressive behaviors may respond in kind, leading to reciprocal patterns of aggression and victimization. Studies that show a high likelihood of mutual roles as perpetrators and victims of school bullying support this explanation[25][26].

Secondly, the negative social stigma associated with hyperactivity/impulsivity can increase the likelihood of school bullying victimization. Elementary students exhibiting hyperactivity/impulsivity often display various forms of problematic behavior in school. For example, they may disrupt class by not staying seated, interfere with collaborative tasks by engaging in disruptive actions, or interrupt teaching activities with irrelevant questions. These problematic behaviors lead to negative labeling by peers and teachers. Students who receive such negative labeling are more likely to become targets of school bullying. Numerous studies have shown a high correlation between social stigma and school bullying victimization, supporting this rational interpretation[27].

4.3. The impact of negative peer relationships on school bullying victimization

The analysis results indicate that negative peer relationships increase the likelihood of school bullying victimization. These findings align with previous studies that highlight peer relationships as a crucial factor influencing school bullying victimization[9][28]. The following explanations can be provided for why negative peer relationships in elementary students increase the risk of school bullying victimization.

Firstly, peer groups can serve as a protective barrier against school bullying perpetration. School bullying often involves a power hierarchy where a student in a higher position attacks a student in a lower position. Students who maintain positive peer relationships form a community with their friends, making it difficult for more powerful students to attack them easily. This dynamic is similar to how herbivores form groups to protect themselves from predators. Conversely, students with negative peer relationships lack such a protective barrier, making them more vulnerable to school bullying victimization.

Secondly, the modeling of school bullying behaviors due to negative peer relationships can increase the likelihood of victimization. Modeling refers to the imitation of others' behaviors. In the context of school bullying, children often imitate the violent behaviors of their peers. Students with negative peer relationships are more likely to be victimized by their peers. The problem is that such school bullying can be modeled by other children, leading to a perpetuation of victimization for those maintaining negative peer relationships. Previous study demonstrating the modeling effect of school bullying support this hypothesis[29].

4.4. Impact of inattention, hyperactivity/impulsivity, and negative peer relationships on school bullying victimization

According to the analyzed results, inattention, hyperactivity/impulsivity, and social relationships influence school bullying victimization through the following pathways. Firstly, hyperactivity/impulsivity tendencies increase inattention tendencies, and this increased inattention significantly impacted school bullying victimization. Secondly, hyperactivity/impulsivity worsened peer relationships, and these deteriorated peer relationships increased school bullying victimization. Lastly, negative peer relationships increased inattention, and the increased inattention, in turn, increased school bullying victimization.

Numerous studies have examined the sub-factors of ADHD tendencies—inattention and hyperactivity/impulsivity—and peer relationships, generally finding that these tendencies negatively influence each other in peer interactions[30][31]. Firstly, hyperactivity/impulsivity has been reported to negatively impact peer relationships significantly. Hyperactivity/impulsivity refers to an inability to control one's actions, leading to excessively impulsive behaviors without caution. Establishing positive peer relationships requires consideration for others and behavioral restraint, making it evident that children exhibiting hyperactivity/impulsivity would naturally form negative peer relationships. Secondly, inattention symptoms are reported to have a reciprocal negative impact on peer relationships. Negative peer relationships cause significant stress for children. Children with inattention symptoms often experience these negative peer relationships chronically and long-term. Chronic and prolonged stress can lead to emotional issues such as depression and anxiety, further exacerbating inattention symptoms.

This study identified three pathways through which hyperactivity/impulsivity, inattention, and peer relationships influence school bullying victimization. These pathways illustrate the specific processes by which sub-factors of ADHD tendencies and negative peer relationships interact and ultimately impact school bullying victimization. These findings provide new insights for developing effective programs and policies aimed at preventing and addressing school bullying among elementary school students, a growing societal concern.

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6. Appendix

6.1. Author's contribution

	Initial name	Contribution
Author	JC	<ul style="list-style-type: none"> -Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/> -Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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Corresponding author*
E-mail: skcho@ikw.ac.kr

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Analysis of Differences in Health Care Awareness According to Working Period of Public Officials -Focusing on Korean Police Officers-

Sunggu Jo

Kyungwoon University, Gumi, Republic of Korea

Abstract

Purpose: This study aims to explore the awareness of health management among Korean police officers according to their working period. Health management ensures rapid on-site response and continuous work performance, and helps with stress management and accident prevention. Physical and mental health management is important for improving personal well-being and job performance efficiency. Ultimately, this will enhance trust among citizens and support sustainable operation of the organization. Therefore, this study will enable us to understand the current status of health management among Korean police officers.

Method: The data processing of this study was conducted using the statistical package program SPSS 23.0 Program, and statistical verification was performed as follows according to the purpose of data analysis. First, frequency analysis was conducted using the SPSS/PC+23.0 program to identify general characteristics. Second, One Way ANOVA was conducted to identify differences in health management awareness according to working period.

Results: This study explored the differences in health management awareness by working period of police officers, and the results of the study showed no significant differences in health management by working period. The reasons why health management has become important in Korea were analyzed as economic development, improved education level, development of medical technology, government policy, and changes in social awareness. Economic development increased income and accessibility to medical services, and improved education level activated health education. In addition, advanced medical technology and the national health insurance system promote early diagnosis and preventive treatment, and the government's health promotion policy and social Well-being trend can be seen as increasing health management awareness.

Conclusion: First, we need to build a customized health care system to prevent and manage chronic diseases. Second, we need to eliminate the gap in access to medical services between urban and rural areas. Third, we need to strengthen education and training programs to improve the quality of medical personnel. Fourth, we need to improve the efficiency and accessibility of medical services through the introduction of digital healthcare. Finally, we need to strengthen international cooperation and global healthcare cooperation.

Keywords: Healthcare, Working Period, Public Official, Police Officer, Special Characteristics of Korea

1. Introduction

1.1. Korea's special characteristics

To understand the unique security environment of Korea, located in the Northeast Asian region, it is necessary to examine the North Korean issue in particular. Korea experiences unique security and security issues due to its division with North Korea. This issue has a significant impact on Korea's domestic policies and international relations, and various factors are working together in a complex manner [1][2][3].

The key is the military tensions with North Korea and the standoff between the two Koreas. South Korea and North Korea are still officially at war since the Korean War of 1950-53, which is a ceasefire agreement. This means continued military tensions and the possibility of conflict. The DMZ (Demilitarized Zone) is a major point where military conflicts can occur[4]. Since then, North Korea's provocations and threats have continued to occur, and North Korea has periodically heightened tensions through missile tests and military provocations[5][6][7]. This has a direct impact on the security environment in South Korea, and the importance of security services in large cities such as Seoul is emphasized[8]. Therefore, South Korea is strengthening its security and defense through its military alliance with the United States. The presence of the US Forces in Korea acts as a deterrent against North Korea's military threats, and joint military exercises between the two countries further strengthen this deterrence, and security issues within South Korea have become very important, and North Korea is carrying out anti-South Korea operations in various ways within South Korea. This includes espionage, information gathering, and propaganda activities.

South Korea's counterintelligence agencies, including the police, are continuously strengthening their intelligence gathering and intelligence activities against North Korea to counter these threats, and in the meantime, North Korean defectors may cause various security problems in the process of settling into South Korean society. Some of them may be undercover agents under the orders of the North Korean regime, and the South Korean government is thoroughly verifying and managing them[9][10].

Table 1. Changes in the number of North Korean defectors entering the country.

	2001s	2002s	2003s	2004s	2005s	2006s	2007s	2008s
Male	565	510	474	626	424	515	573	608
Female	478	632	811	1,272	960	1,513	1,981	2,195
	2009s	2010s	2011s	2012s	2013s	2014s	2015ss	2016s
Male	662	591	795	404	369	305	251	302
Female	2,252	1,811	1,911	1,098	1,145	1,092	1,024	1,116
	2017s	2018s	2019s	2020s	2021s	2022s	2023s	2024s (Currently)
Male	188	168	202	72	40	35	32	8
Female	939	969	845	157	23	32	164	35

Note: <https://www.unikorea.go.kr/> (2024).

1.2. Characteristics of Korean police officers

1.2.1. Police organization

As of 2023, the total number of Korean police officers is approximately 110,000. The Korean police are largely divided into the National Police Agency and local police agencies, and local police agencies are further divided into police stations, district offices, and police boxes in each region.

The 'National Police Agency' is a police organization of the central government and is respon-

sible for the security of the entire country, while the ‘Local Police Agency’ is organized by metropolitan city and province and is responsible for local security. The ‘police station’ located in each region exists at the city, county, and district level and is responsible for the security of a detailed region. In addition, ‘district offices’ and ‘police boxes’ are established in each village and serve as the lowest-level organizations under the police station, and their main missions are to maintain daily security and contact with residents[11][12][13].

In addition, there are special forces in the Korean police organization, and there are special forces within the police organization to respond to specific crimes or disaster situations, and they are divided into various special fields in all fields such as cyber security.

1.2.2. Characteristics of police personnel

Korean police officers receive systematic education and training at the National Police University, the National Police Training Institute, and local police academies. In particular, the National Police University is operated as a four-year university course, and personnel graduated from it are commissioned as police officers. In addition, there are about 120 universities in Korea that have college students majoring in police science, and they are selected as police officers through the open police officer recruitment exam[14][15].

Korean police ranks are divided into police officers, superintendents, sergeants, inspectors, superintendents, superintendents, superintendents, superintendents, superintendents, superintendents of police, superintendents of police, and superintendents of police. Promotions are made based on years of service, performance, and exams.

Police officers perform various criminal investigation tasks such as criminal case investigation, traffic control, drug crime crackdown, and cyber crime investigation, and perform order maintenance tasks when large-scale gatherings or protests occur, and actively work in disaster situations. In addition, district police stations and police boxes maintain close relationships with residents, and are responsible for handling various civil complaints and safety education. They also respond to various social issues such as school violence prevention, missing person search, and domestic violence response. In addition, the Korean police cooperate with international police organizations such as INTERPOL and ASEANAPOL to respond to international crimes[16][17][18]. This contributes to enhancing the ability to respond to international crimes and terrorism.

In addition, the use of advanced technologies is increasing, and the Korean police are strengthening security activities utilizing advanced technologies[19][20]. Examples include CCTV, drones, and crime prediction systems using AI technology. In addition, they are strengthening specialized personnel and systems for responding to cybercrimes. And the Korean government's will to improve security services is continuously increasing police personnel.

Table 2. Population change in charge per police officer.

	2009s	2010s	2011s	2012s	2013s	2014s	2015s
Number of police officers	99,554	101,108	101,239	102,386	105,357	109,364	113,077
Per person population in charge	498	492	501	498	485	469	456
	2016s	2017s	2018s	2019s	2020s	2021s	2022s
Number of police officers	114,658	116,584	118,651	122,913	126,227	128,985	131,004
Per person population in charge	451	444	437	422	411	400	393

Note: <https://www.police.go.kr/> (2024).

The biggest change in recent years is the increase in the proportion of female police officers in recent years. As of 2023, the proportion of women among the total police force is about 13%. In addition, the number of multicultural police officers is gradually increasing to handle foreign crimes and multicultural families.

If we look at the characteristics of the Korean police, it is composed of personnel who have received systematic education and training in various fields, and they perform various tasks such as criminal investigation, maintaining social order, and resident services. Recently, they are modernizing their security activities through the introduction of advanced technology and international cooperation, and are also making progress in terms of gender and diversity.

1.3. Importance of health management for police officers

Health management for police officers is very important to improve their personal well-being and job performance efficiency. Health management is essential because police officers are exposed to a lot of physical and mental stress and risks[21][22].

Physical health for improving job performance efficiency is necessary because they have to perform physically demanding tasks. Physical training and health management ensure rapid response and continuous work performance in the field, and physically healthy police officers can demonstrate high efficiency in arrests, pursuits, and rescue operations. Mental health is also important because police officers are exposed to various stressful situations. Appropriate mental health management improves decision-making and emotional control abilities, thereby increasing job performance efficiency[23].

Therefore, healthy police officers can provide public security services more effectively and kindly. This not only promotes trust between police and citizens and contributes to maintaining the safety and stability of the community, but also enables police organizations to operate sustainably by maintaining healthy human resources. This increases organizational efficiency and ensures organizational stability and development in the long term.

Therefore, this study explored the health management awareness of Korean police officers according to their period of working, and the results of this study will provide a glimpse into the current status of health management of Korean police officers.

2. Research Method

2.1. Research subjects and sampling method

In this study, among police officers in the security department as of recent who had experience in work related North Korean defectors, 100 trainees in the Police Human Resources Development Institute were surveyed via self-administration method. Among the collected survey questionnaires, 91 were selected as valid samples, excluding those whose answers were incomplete or missing.

Table 3. The general characteristic of the research subjects.

	Description	N (%)	Total
Gender	Male	61 (67.0%)	91
	Female	30 (33.0%)	
Age	20s	7 (7.7%)	91
	30s	28 (30.8%)	
	40s	30 (33.0%)	
	50s or older	26 (28.6%)	

Education	High school	14 (15.4%)	91
	Junior college	30 (33.0%)	
	College	43 (47.3%)	
	Graduate school	4 (4.4%)	
Rank	Police men/women	1 (1.1%)	91
	Senior police men/women	19 (20.9%)	
	Assistant inspector	18 (19.8%)	
	Inspector	29 (31.9%)	
	Senior inspector	14 (15.4%)	
	Superintendent	10 (11.0%)	
Employment path	General recruitment	75 (82.4%)	91
	Special recruitment	5 (5.5%)	
	Police Academy	2 (2.2%)	
	Police cadet	9 (9.9%)	
	Other	0 (0.0%)	
The total period of working as a police officer	5 years and less	13 (14.3%)	91
	6-10 years	32 (35.2%)	
	11-15 years	13 (14.3%)	
	16-20 years	13 (14.3%)	
	Longer than 20 years	20 (22.0%)	
The period of working at the security department	2 years and less	16 (17.6%)	91
	3-5 years	56 (61.5%)	
	6-10 years	17 (18.7%)	
	Longer than 10 years	2 (2.2%)	
The number of police officers in the organization	10 or less	18 (19.8%)	91
	11-15	42 (46.2%)	
	16-20	24 (26.4%)	
	More than 21	7 (7.7%)	
Working location	Tier 1 areas (big cities)	80 (87.9%)	91
	Tier 2 areas (small/medium-sized cities)	11 (12.1%)	
	Tier 3 areas (rural areas)	0 (0.0%)	

2.2. Measuring instrument

The appropriate method for each verification method was chosen to increase the content validity and verify the construct validity of the questionnaire. Content validity was validated through consultation with relevant experts to adopt survey questions suitable for the purpose of the study.

Table 4. The questions.

	Questions
Q-1	I exercise regularly to maintain my health.
Q-2	I manage my sleep time to maintain my health.
Q-3	I take nutritional supplements regularly to maintain my health.
Q-4	I check my blood pressure regularly to maintain my health.
Q-5	I manage my stress to maintain my health.

2.3. Data processing and analysis method

The data processing of this study was conducted using the statistical package program SPSS 23.0 Program, and statistical verification was performed as follows according to the purpose of data analysis.

First, frequency analysis was conducted using the SPSS/PC+23.0 program to identify general characteristics.

Second, One Way ANOVA was conducted to find out the difference in health management awareness according to the period of police working.

3. Research Results

3.1. Differences in police officers' awareness of health management by total police working period

Table 5. Differences in perceptions of manage health by total working period among police officers.

		N	M	SD	F	sig	post hot
Q-1	5 years or less	13	2.6923	.63043	1.701	.157	
	6 years or more to 10 years or less	32	2.8438	.36890			
	11 years or more to 15 years or less	13	2.6923	.48038			
	16 years or more to 20 years or less	13	2.9231	.49355			
	20 years or more	20	3.1000	.71818			
Q-2	5 years or less	13	2.8462	.80064	2.299	.065	
	6 years or more to 10 years or less	32	2.9063	.46555			
	11 years or more to 15 years or less	13	2.8462	.37553			
	16 years or more to 20 years or less	13	3.1538	.55470			
	20 years or more	20	3.3000	.65695			
Q-3	5 years or less	13	2.8462	.68874	1.033	.395	
	6 years or more to 10 years or less	32	3.0313	.69488			
	11 years or more to 15 years or less	13	2.8462	.55470			

	16 years or more to 20 years or less	13	3.0769	.49355			
	20 years or more	20	3.2500	.78640			
Q-4	5 years or less	13	3.2308	.72501	1.387	.245	
	6 years or more to 10 years or less	32	3.2188	.60824			
	11 years or more to 15 years or less	13	2.8462	.68874			
	16 years or more to 20 years or less	13	3.3077	.48038			
	20 years or more	20	3.3500	.67082			
Q-5	5 years or less	13	3.2308	.72501	1.079	.372	
	6 years or more to 10 years or less	32	3.2188	.65915			
	11 years or more to 15 years or less	13	2.9231	.49355			
	16 years or more to 20 years or less	13	3.2308	.59914			
	20 years or more	20	3.4000	.68056			

Note: A: 5 years or less, B: 6 years or more to 10 years or less, C: 11 years or more to 15 years or less, D: 16 years or more to 20 years or less, E: 20 years or more.

<Table 5> shows the difference in health management awareness according to the total period of police working in the organization to which they belong. The analysis results showed that there was no difference in the total period of police working and health management awareness.

3.2. Security department (North Korean defector management) police officers' awareness of health management according to working period

Table 6. Security department (North Korean defector management) health management awareness according to working period.

		N	M	SD	F	sig	post hot
Q-1	2 years or less	16	2.6875	.60208	1.898	.136	
	3 years or more to 5 years or less	56	2.8571	.51974			
	6 years or more to 10 years or less	17	3.0000	.50000			
	10 years or more	2	3.5000	.70711			
Q-2	2 years or less	16	2.9375	.68007	1.031	.383	
	3 years or more to 5 years or less	56	2.9643	.53815			
	6 years or more to 10 years or less	17	3.2353	.66421			
	10 years or more	2	3.0000	.00000			
Q-3	2 years or less	16	2.9375	.68007	.517	.671	
	3 years or more to 5 years or less	56	3.0179	.64642			
	6 years or more to 10 years or less	17	3.1176	.78121			
	10 years or more	2	3.5000	.70711			
Q-4	2 years or less	16	3.0625	.68007	1.346	.265	

	3 years or more to 5 years or less	56	3.2321	.66033			
	6 years or more to 10 years or less	17	3.1765	.52859			
	10 years or more	2	4.0000	.00000			
Q-5	2 years or less	16	3.2500	.68313	1.064	.369	
	3 years or more to 5 years or less	56	3.1786	.63553			
	6 years or more to 10 years or less	17	3.2353	.66421			
	10 years or more	2	4.0000	.00000			

Note: A: 2 years or less, B: 3 years or more to 5 years or less, C: 6 years or more to 10 years or less, D: 10 years or more.

<Table 6> shows the difference in awareness of health management according to the period of working in the Security Department (North Korean defector management). The analysis results showed that there was no difference in awareness of health management and the period of working in the Security Department (North Korean defector management).

4. Discussion

In addition to differences in health management awareness according to police working period, there were no differences in health management according to working period for police security officers (North Korean defector management), which reflects the unique characteristics of Korea. This is thought to be due to a combination of various factors, including economic development, improved education level, development of medical technology, government policy, and changes in social awareness, which are the reasons for the maturation of the social atmosphere regarding health management in Korea.

First, economic development and improved living standards led to increased income and improved living standards. In Korea, increased income due to economic growth improved living standards and allowed individuals to invest more resources in health management, which not only led to increased demand for health foods, fitness centers, and healthcare products and services, but also led to improved accessibility to medical services, which expanded medical infrastructure and increased accessibility to medical services. This contributed to recognizing the importance of regular health checkups and preventive health management[24][25].

Second, improved education levels also strengthened health education, and health education was strengthened through school curricula. Students are educated about healthy lifestyle habits, nutrition, exercise, disease prevention, etc., and this continues into adulthood. Access to information has increased, and the spread of the Internet and smartphones has increased access to health-related information. This has enabled individuals to search for health information on their own and acquire knowledge about health management. This education has emphasized the importance of health management within the family, forming a culture in which all generations take care of their health together[26]. This has a positive impact on society as a whole through child education and family health management.

Third, the development of medical technology and systems has led to the development of advanced medical technology, and the development of advanced medical technology has made early diagnosis and preventive treatment possible, further highlighting the importance of health management[27][28]. This has enabled individuals to better understand and manage their own health status. In particular, the expansion and strengthening of the National Health Insurance System in Korea has enabled all citizens to receive basic medical services, promoting regular

health management and preventive treatment. If you go to a hospital in Korea, you only have to pay about 30% of the medical expenses, etc., as a benefit of the National Health Insurance [29].

Fourth, the government's health promotion policy promotes health campaigns and programs, and the government is promoting the health of the people through various health campaigns and programs. By expanding smoking cessation campaigns, obesity prevention programs, and exercise promotion campaigns, many local governments are promoting health city projects through health city projects to carry out various activities to promote the health of residents [30]. This contributes to creating an atmosphere of health management at the community level. Fifth, the change in social awareness has changed into a well-being trend, and well-being has become an important trend in society. As the number of people pursuing healthy lifestyle habits, mental stability, and a balanced life has increased, interest in health management has also increased. This well-being has had a positive effect on the public's awareness of health management as celebrities, celebrities, and influencers publicly share their healthy lifestyle habits [31].

5. Conclusion and Suggestions

This study confirmed that Korean police officers continue to manage their health regardless of their period of working. Although Korea's health management system is highly regarded worldwide, there are challenges that need to be addressed in the mid- to long-term.

First, an integrated approach is needed to prevent and manage chronic diseases (diabetes, hypertension, cardiovascular disease, etc.) by establishing a medical system focused on chronic disease management and prevention of public officials such as police officers. It is necessary to expand health checkups, expand prevention programs, and improve lifestyle habits through personalized health management, and to introduce a personalized health management system using big data and AI to prepare personalized prevention and treatment plans that fit each individual's health condition.

Second, in order to resolve the gap in access to medical services between urban and rural areas, local medical infrastructure should be improved, and in addition to a balanced distribution of medical personnel, the coverage of health insurance should be strengthened and medical expense support programs should be expanded to improve the health of public officials such as police officers.

Third, although Korea already has a large hospital exclusively for police officers, continuous education and training programs should be strengthened and specialized medical personnel should be trained to improve the quality of medical personnel. This requires more innovative improvements in the systems and culture of medical institutions to provide patient-centered medical services for public officials such as police officers through a system that supports them in acquiring the latest medical technology and knowledge. This includes measures to reflect the opinions of patients and promote the participation of patients and their families in the treatment process.

Fourth, digital medical technology should be expanded through the introduction of digital healthcare, and digital medical technologies such as AI, big data, and telemedicine should be expanded to increase the efficiency of medical services and improve accessibility. In particular, the legal and institutional foundation for telemedicine should be established so that rural and island residents can also receive quality medical services. However, special attention should be paid to the security of sensitive data and personal information of public officials such as police officers, and personal information protection and data security have become important as digital healthcare expands. A strong data security system and legal protection measures should be established.

Lastly, international medical cooperation should be strengthened through international co-operation and global healthcare. In particular, global healthcare cooperation in Northeast Asia should be strengthened to effectively respond to international health issues through epidemic response, medical research, and personnel exchange.

In particular, Korea needs to demonstrate leadership in the global health sector, cooperate with international health organizations, strengthen medical support and education for medically underdeveloped and developing countries, and expand medical technology exports to North Korea, China, and Southeast Asia, which will help build a safer health environment in East Asia.

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7. Appendix

7.1. Author's contribution

		Initial name	Contribution
Author	SJ		-Set of concepts <input checked="" type="checkbox"/>
			-Design <input checked="" type="checkbox"/>
			-Getting results <input checked="" type="checkbox"/>
			-Analysis <input checked="" type="checkbox"/>
			-Make a significant contribution to collection <input checked="" type="checkbox"/>
			-Final approval of the paper <input checked="" type="checkbox"/>
			-Corresponding <input checked="" type="checkbox"/>
			-Play a decisive role in modification <input checked="" type="checkbox"/>
			-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>
			-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/>
			-Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

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