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The Effect of TOURISM CONSTRAINTS on the Tourism Related Satisfaction in a Pandemic Situation

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Abstract

Purpose: This study examines the factors of tourism constraints which influence the tourism industry, discover the factors which can increase the tourism related satisfaction by articulating the effects of tourism constraints on the tourism related satisfaction, and utilize them for developing and marketing the tourism resources and tourism products required for the growth of the sustainable tourism industry.

Method: In order to achieve the purpose of this study as such, the factors were derived through the factor analysis, and the multiple regression analysis was performed to examine the relationship between the tourism constraints and the tourism related satisfaction, and the following conclusions were arrived.

Results: First, as a result of the exploratory factor analysis, it turned out that health and cleanliness (sanitation) were the variables which have had the largest influence on the tourism constraints, followed by safety, climate and weather. That is, it may be said that securing and guaranteeing health, hygiene, and safety would determine the success of being a tourist destination. Hence, as for the tourism revitalization and the sustainable development in the aftermath of the pandemic, thorough preparations for infectious diseases which may occur again, hygiene and cleanliness of tourist destinations, and the environment for achieving political and economic stability and safety are required alongside the measures for achieving them.

Second, based on the analysis of the causal relationship between the tourism constraints and the tourism related satisfaction, tourist destination related environmental constraints, internal constraints, and economic and environmental constraints influence the tourism related satisfaction in a positive direction, and the information and health constraints have a negative effect on the tourism related satisfaction, while the information and health constraints turned out to have a negative effect on the tourism related satisfaction.

Conclusion: That is, it means that the satisfaction following tourism increases in the case of overcoming tourism environment, internal and economic and environmental constraints, and the tourism related satisfaction would decrease if there are information and health constraints. Hence, when planning and developing the tourism products after the pandemic, it is necessary to investigate and examine as to whether the tourist destination can respond to and treat infectious diseases, possibility of the occurrence of abnormal climates such as El Niño, and countermeasures, etc.

[Keywords] Pandemic, Growth, Tourism Constraints, Tourism Related Satisfaction, Sustainable

1. Introduction

An infectious disease called "COVID-19," which first broke out in clusters in China in December 2019, spread rapidly across the globe[1][2], and eventually in April 2020, earned the status of a pandemic from the World Health Organization[3]. In Korea, after the first patient was discovered on January 20, 2020, the social infection crisis of the first epidemic spread between February and April due to the group infection of Shincheoji Church, and currently, over 1,400

people are infected per day, yet over 70% of the people have been vaccinated, whereby normalization is taking place[4].

Pandemic refers to stage 6, which is the highest stage of an epidemic risk[5], and such a pandemic crisis has never been a major turning point for the tourism industry[6], and as of 2021, the tourism industry has been very hit hard by the pandemic caused by the COVID-19[7][8].

Tourism gains the educational effects through the direct experience of the tourists, allows them to recover from the physical and mental fatigue, enhances vitality, performs a function as a medium to convey heterogeneous cultures, while creating the effect of transferring cultures between countries and enhancing mutual understanding between countries based on the international exchanges of foreign tourists[9]. Furthermore, tourism can be expected to promote foreign currency acquisitions, economic development, technological cooperation and international trade, and it is a necessary factor in promoting regional development along with the effects of income, employment[10], and industry for the local economy, while being an essential factor in promoting the regional development along with the increased welfare promotion of the residents and the enhanced living environment, further to linking tourists and tourism targets, thereby largely contributing to the development of the national or regional economy as the target location[11].

Furthermore, it not only creates the national income, but also contributes significantly to the national financial income by paying various taxes by the tourism related companies[12][13]. However, tourism products are the products of a high elasticity of demand and are highly influenced by the various tourism constraints, and in particular, they are the products which are subject to many changes or constraints in the domestic and international economic, health and social environment such as travel expenses, exchange rate increases, oil price increases, infectious diseases, and war, etc.[14]. Accordingly, according to the report of the United Nations World Tourism Organization amidst the pandemic, the number of international tourists worldwide in 2020 posted 381 million, which was a decrease of 74% year on year, and by region, the number of international tourists heading the Asia Pacific region fell by 84% to 57 million, which was the largest decline ever. Europe had 221 million, down by 70%, and the Americas had 69 million, down by 69%, Africa(18 million) and the Middle East(16 million people) fell by 75%, each respectively.

In the case of Korea, the rate of decline for the foreign tourists was larger than the rate of decline of the global tourists. A 85.6% decrease was unprecedented, with 2.519 million people were counted as the foreign tourists last year.

China was the country representing the largest number of foreign tourists visiting Korea last year. 686,000 people visited Korea, down by 88.6% year on year. Japan(431,000 people), the United States(220,000 people), Taiwan(167,000 people), the Philippines(116,000 people) and Hong Kong(89,000 people), etc., followed. Also, the number of the Koreans who traveled abroad last year was 4.276,000, down by 85.1% year on year[15].

As such, the tourism industry has been largely influenced by the natural environment such as El Niño and temperature rises, the political and cultural environment such as war, law, and the Korean Wave, as well as the health and social environment including COVID-19 and other infectious diseases. In particular, it is an industry which reacts very sensitively to the economic conditions such as exchange rates, oil prices and economic growth.

Accordingly, the purpose of this study is to examine the tourism constraints such as various internal and external environments at home and abroad which the tourists consider for tourism, psychological and human relationship of tourists, and also examine the effect of economic and environmental constraints on the tourism satisfaction among the tourism constraints, after which identify and articulate the factors which may be used for the tourism product development and tourism marketing through the market segmentation due to economic and environmental constraints, which may lead to the continuous growth of the tourism industry and increase the tourism related satisfaction of tourists.

2. Theoretical Background

2.1. Tourism constraints

Constraint factors are the 'factors which impede an individual's ability to engage in the tourism activities' and are also a framework for broadly understanding the factors which hinder choices, participation, and personal satisfaction for the tourism activities, and have been recognized as an external(personal, situational) environment such as inner psychological state such as time, cost, ability, facilities, and opportunities[16].

Leisure constraints refer to the internal psychological state or characteristics or personality and external environment experienced as a force which restricts an individual's leisure related behavior in a social psychological sense[17]. Since it was perceived that the leisure constraints restrict the individuals' tourism related behaviors, extensive studies have been conducted regarding the factors which restrict leisure activities, yet it has only been recently that the study of leisure constraint factors in the light of the tourism environment has begun[18].

Leisure constraints generally carry the personal(internal) factors such as time, cost, and ability, as well as the social(external) factors such as facilities, opportunities, norms, and standard pressures. It was also claimed that various factors(demographic characteristics, culture, and environment) influence them[19], and Kim & Chalip(2004) claimed that the perception of constraint factors was influenced by the level of motivation, and that motivation precedes the constraint factors[20].

Yanglae Jang et al.(2008) proposed 'visa procedures' as the largest constraint factor due to the inconvenience experienced by the Chinese tourists when visiting Korea through a study on the benefits and constraints for the Chinese tourists, and second, 'traffic congestion,' and third, 'traveling expenses,' and other than them, 23 variables were proposed including 'travel information', friendliness of 'guide' and 'accommodations[21].

Sanggeon Lee and Yooshik Yoon(2005) demonstrated that the demographic factors of potential tourists influence tourism obstacles and influence decision-making on tourism behavior by presenting 11 variables including time leeway, economic leeway, a large number of people, information on tourist destinations, natural environment, inconvenience of transportation, outdoor activity related spaces, accommodation, lack of attractive tourist destinations, vehicles, and social perception.

Furthermore, Sanggeon Lee, Raeheon Song, and Jeongha Park(2006) proposed cost, personal reasons, lack of information on the tourist destination, and congestion of destination as the variables of internal restraint factors in a study on the difference according to market segmentation of leisure activity related constraint factors, and as a result of examining the differences between the general demographic characteristics and travel characteristics for the leisure activity related constraint factors by suggesting the lack of vacation period, traffic congestion, and accommodation as variables, there were some differences in gender, age group, and educational background in terms of the demographic characteristics, and in terms of the travel characteristics, it was uncovered that there were differences in the constraint factors for leisure activities with respect to travel information, travel time, and travel cost[22].

Sulmin Yoon et al.(2007) divided the interpersonal factors and structural factors as leisure constraints in a study on leisure motivation and leisure satisfaction according to the structural constraints, and using 10 variables, claimed that the leisure constraint factors have had a positive effect on the satisfaction with cultural leisure activities[23].

Bongkoo Lee(2008) claimed that in a study on the effect of the tourism related constraint factors on the intention of the disabled to participate in tourism, through the intrinsic constraint factors(10 variables), interactive constraint factors(8 variables), and environmental constraint factors(6 variables), it turned out that the intrinsic, interactive, and the environmental constraints had a negative effect on the intention to participate in tourism/leisure activities, yet were not statistically significant, and also claimed that there was a positive effect on the feeling

of helplessness, and all of such effects turned out to be statistically significant except for the interactive constraints[24].

As such leisure constraints may be said to restrict tourism activities, the tourism constraints may be said to impede or stop participation in tourism activities, or various complex factors may be influenced as per the decision-making process of selecting and participating in tourism activities in different ways depending on the situation, and further influence the participation in the decision of tourism behaviors[25].

Making reference to the studies as in the above, and in this study, 25 tourism constraints variables were derived(difficulty in acquiring tourist information, lack of tourism expenses, lack of clothes, luggage, and time necessary for tourism, occurrence of something more important than tourism, overload, mistakes in choosing a tourist destination, many decisions required for tourism, family's or friends' opposition, sense of guilt about tourism, spouse's objection, lack of a tourist companion, indifference towards tourism, health issues, choice of transportation, exchange rate increase, oil price increase, climate and weather of tourist destination, safety of tourist destination, health and cleanliness, inconvenience of tourist facilities, relationship with tour companions, lack of a cultural understanding of tourist destinations, vague fear of tourism, and relationship with locals).

2.2. Tourism related satisfaction

Satisfaction is a factor which has a significant influence on the evaluation of tourist destinations and the intention to revisit, and Oliver(1980) proposed the expectation-discordance model and claimed that, when the consumption experience turns out to be higher than the previous expectation level, they are satisfied and would make purchases again, whereas when the actual performance is lower than the expected level, they would be very dissatisfied and would seek alternatives for the next purchases[26].

As a result of the differences between the tourist's expectations for the tourist destination and the actual experience, Fridgen(1991) claimed that the tourists who are satisfied with the tourism experiences desire to revisit the tourist destination and generate more potential tourists. That is, the tourist satisfaction may be considered to be among the important judgement criteria for the tourists to evaluate the tourism services[27].

Beard & Ragheb(1980) defined the tourism related satisfaction as the extent of positive emotions or cognition formed after participating in an individual's chosen leisure activity, while Lounsbury & Polik(1992) claimed that the overall ex post satisfaction of tourism is a kind of attitude towards the tourism experience, as the tourists themselves evaluate the ex post image of the total tourism experiences. Ross(1993) claimed that the tourism related satisfaction is the overall evaluation of an individual's experience while going on tours, and that the cognitive approach of expectation-performance discrepancy is the most dominant paradigm in the tourism related satisfaction research[28].

Tourist satisfaction is mainly divided and studied from the perspective of the result or evaluation process arising from the tourism consumption experience, and is also divided into the input-output viewpoint, the expectation-consistency/disagreement viewpoint, viewpoint of emotion or emotional response, and the comprehensive viewpoint. Satisfaction is a relative measure and is also usually defined as the difference between the expectations and actual situations[29].

Mimi Wang and Beomsoo Han(2005) classified, as for the effect of inter cultural acceptance capacity on the tourism related satisfaction, the factors of satisfaction into satisfaction with transportation(4 variables), satisfaction with tourist destinations(4 variables), satisfaction with food(4 variables), satisfaction with accommodation(3 variables), attitude toward local residents and local life(4 variables), and analyzed that there was a significant difference in the inter cultural acceptance capacity and the tourism related satisfaction according to the tourist's visiting behaviors.

Furthermore, Taeyoung Cho(2009) derived the benefits of visit, wise choice, and the attractiveness of traditional culture as the variables of the tourism related satisfaction as for the effect of cultural uniqueness on the tourism satisfaction and the behavioral intention based on the regression analysis and the multiple regression analysis, and revealed that the existential uniqueness among the factors of uniqueness turned out to have the largest influence on the tourism satisfaction, and that the tourism satisfaction has had a positive effect on the revisits and the word of mouth.

Based on the previous studies as in the above, this study derived the 3 variables of the tourism related satisfaction – "My spirit has been enriched," "Tour has made me happy," and "Going on tour is worth it."

3. Research Method

3.1. Sample design and the survey structure

The population of this study is the entire people, and the sample is those who have experienced tourism within the last year. Among the non-probability sampling methods, the sample was extracted by using the convenience sampling method. The survey period was conducted for a total of 15 days from August 20, 2021 through September 3, 2021, and the sample was surveyed based on the face-to-face interviewing method. A total of 400 questionnaires were distributed, among which, an effective sample of 345 copies(effectiveness of 86%) was obtained and used for the empirical analysis, excluding the 48 questionnaires with low accuracy or insincere responses.

The tourism constraints' attribute variables were consisted of 25 questions based on the previous studies, and the tourism related satisfaction's attribute variables were consisted of 3 questions, and the importance was evaluated on a 5-point Likert scale ranging from 'Not at all' to 'Very much.' As for the demographic characteristics, the questionnaires were consisted of 36 questions, consisted of 8 questions on a nominal scale, such as tourist destination, companion, gender, age, marital status, education level, occupation, and average monthly income, respectively.

3.2. Analytical method

As an analytical method for the survey data, the frequency analysis was performed for the descriptive statistics for the demographic characteristics and the measurement variables of the sample, and the exploratory factor analysis was performed to extract the factors for tourism constraints and tourism related satisfaction, while the multiple regression analysis was performed to examine and discover the relationship of influence on the tourism related satisfaction.

4. Empirical Analysis

4.1. General characteristics of the sample

<Table 1> illustrates the demographic characteristics of the sample as per examination. In the distribution of tourist destinations, the domestic destinations accounted for 48.8% and the overseas 51.2%, which were evenly distributed, and in the distribution of companions, families accounted for the most with 39.7%, and singles with 6.3% turned out to be the least. The gender distribution turned out to be 54% of male, which was higher than the female of 46.0%, and the age distribution was 38.1% in their 20s, 36.9% in their 30s, 75% in their 20s through the 30s, and 14.7% in their 40s, 8.7% in their 50s, while those in their 60s or older accounted for 1.6%, respectively. As for the educational background, the age distribution was focused primarily upon the 20s and 30s, and hence, 44.0% were college and university graduates and 29.3% were

graduate students, accounting for more than 73%. The average monthly income was 28.6% for those with less than 2 to 3 million won, 21.0% for less than 1 million won and 3 to 4 million won, and those with less than 1 million won to less than 2 million won were 11.1%, those with 4 million won to less than 5 million won turned out to be the lowest for 9.1%, each respectively. In the distribution of marriage, it turned out that the married were 47.2% and the unmarried were 52.8%, which were evenly distributed, and finally, in the terms of the occupational distribution, office workers and technicians turned out to have the highest distribution of 40.9%, whiel the corporate executives were the lowest of 2.0%, respectively.

Table 1. Demographic characteristics of the sample.

Classification		Respondents (people)	Ratio (%)	Classification		Respondents (people)	Ratio (%)
Tourist destination	Domestic Overseas	168 177	48.8 51.2	Academic background	High school graduate or less Community college graduate College or university graduate Graduate school or above	56 36 152 101	16.3 10.3 44.0 29.4
Companion	Alone Family Friend Colleague Others	22 137 115 47 24	6.3 39.7 33.3 13.5 7.1	Average monthly income	Less than 100 million won Less than 100 to 200 million won Less than 200 to 300 million won Less than 300 to 400 million won 400 to less than 500 million won Over 500 million won	72 38 99 72 31 31	21.0 11.1 28.6 21.0 9.1 9.1
Gender	Male Female	186 159	54.0 46.0	Marriage	Married Single	163 182	47.2 52.8
Age	20's 30's 40's 50's Over 60	131 127 16 30 6	38.1 36.9 4.7 8.7 1.6	Occupation	Public servant Corporate executive Office worker/technician Education/research position Professional/freelance Self-employment Student Others(unemployed, etc.)	11 7 141 62 22 10 55 38	3.2 2.0 40.9 17.9 6.3 2.8 15.9 11.1

Note: N=345.

4.2. Results of the exploratory factor analysis

The exploratory factor analysis is one which extracts concepts or factors in the absence of existing theories or prior knowledge about the research model[30], and the analysis was performed by using the correlation matrix of the principal component analysis, and the variable max rotation method of orthogonal rotation was used for the factor rotation. As for the number of common factors, the factors greater than 1 were extracted based on the eigen value, which

demonstrates the explanatory power of variables for the common factors extracted from factor analysis. It may be said that the higher the factor loading value related to the influence of variables on common factors, the better. However, there is no absolute standard since there is a tendence to decrease as the number of samples and measurement variables increase(Hair, Anderson, Tatham, & Black, 2006).

4.2.1. Results of the exploratory factory analysis for the tourism constraints

As a result of performing the exploratory factor analysis by applying the criteria as in the above, 6 factors were extracted from 25 measurement variables of tourism constraints. However, after removing 5 variables which had a high cross-sectional value and problematic discriminant validity, the secondary factor analysis was performed, and 6 factors were generated with 20 variables, and the results are as illustrated in <Table 2> below.

As a result of the analysis performed, 6 factors were extracted and demonstrated 69.89% of the variance explanatory power of the total variance. In order to determine the conformity of the factor analysis model, the Bartlett's sphericity test and the Kaiser-Meyer-Olkin's sample conformity test were conducted, and consequently, the approximate χ2 of the Bartlett's sphericity test was 2031.937 and the degree of freedom = 171, which indicated that the 'correlation between variables at 0.1% level' as a null hypothesis that the matrix is 0' was dismissed.

Table 2. Results of the exploratory factor analysis for the tourism constraints.

Name of variable	Factor load	Eigenvalue	Distributed explanatory power
Factor 1: tourist destination related environmental constraint Health and cleanliness of tourist destinations Safety of tourist destinations Inconvenience of tourist facilities Climate and weather of tourist destinations	.858 .840 .735 .674	2.756	14.505
Factor 2: internal constraints Opposition of family or friends Sense of guilt towards tour Spouse's opposition Mistakes in choosing tourist destination	.816 .751 .747 .454	2.433	12.805
Factor 3: local fear constraint Vague fear of tourist destinations Lack of cultural understanding of tourist destinations Relationship with local people	.820 .801 .783	2.312	12.170
Factor 4: time constraint Overload of work Something more important than tourism has occurred Lack of time	.865 .815 .763	2.117	11.141

Factor 5: economic and environmental constraints Exchange rate increases Oil price increases Lack of tourism expenses	.921 .902 .752	1.895	9.971
Factor 6: information/health constraints Choice of transportation Health issues Indifference to tourism	.747 .636 .599	1.766	9.295

Note: Cumulative value of explanatory variance=69.89%, KMO=.778, Bartlett's sphericity test approximation χ2=2031.937(df=171, Sig=.000).

Measurement scale. 1 = Not at all, 5 = Very much.

In the KMO sample conformity test, if it turns out to be 0.5 or more, the factor analysis may be performed, and if it is 0.7 or more, it may be said that it is conforming for the factor analysis. Yet in this study, it was appropriately presented as .837. The common value demonstrating the variance explanatory power of the entire factors of individual questions was presented as .414 through .842, demonstrating a rather low commonality in the 'mistakes in choosing a tourist place', but it is not such a major problem. The factor loadings related to the influence of factor component variables ranged from 0.674 to 0.858 for factor 1, 0.454 to 0.816 for factor 2, 0.783 to 0.820 for factor 3, 0.763 to 0.865 for factor 4, and 0.752 to 0.921 for factor 5, and factor 6 was presented as high as from 0.599 to 0.747, presenting that the scale was appropriate.

Based on the results analyzed as in the above, the extracted factors were assigned names, and considering the conceptual relevance of the variables, factor 1 was named as the 'tourist destination related environmental constraint', factor 2 as the 'internal constraint', factor 3 as the 'local fear constraint', factor 4 as the 'time constraint', factor 5 as the 'economic and environmental constraints', and factor 6 was named as the 'information/health constraint'.

The variance explanatory power of each factor was 14.50% for the tourist destination related environmental constraints, 12.80% for the internal constraints, 12.17% for the local fear constraints, 11.14% for the time constraints, 9.97% for the economic and environmental constraints, and 9.29% for the information/health constraints, respectively. As for the average value of the factor, the tourist environment constraint turned out to be 3.19, internal constraint was 2.01, local fear constraint was 2.22, time constraint was 3.70, economic environment constraint was 3.39, and the information/health constraint turned out to be 2.01, whereby the factor with the highest factor mean value turned out to be the time constraint(3.70), and the lowest factor turned out to be the internal constraint(2.01) and the information/health constraint(2.01). As for the factor reliability, the tourist environment constraint was 0.834, the internal constraint was 0.739, the local fear constraint turned out to be 0.830, time constraint was 0.772, economic environment constraint was 0.817, and the information/health constraint turned out to be 0.702, and there was no variable which caused the factor reliability to decline.

4.2.2. Results of the exploratory factor analysis for the tourism related satisfaction

As a result of the exploratory factor analysis performed, 1 factor was extracted from the 3 measurement variables of tourism related satisfaction, and the results are as illustrated in <Table 3>.

Table 3. Results of the exploratory factor analysis for the tourism related satisfaction.

Name of variable	Factor load	Eigenvalue	Distributed explanatory power
Factor: tourism related satisfaction		2.056	68.519
Going on tour is worth it.	.859		
Tour has enriched my spirit.	.832		
Going on tour made me happy.	.791		

Note : Cumulative value of explanatory variance=68.52%, KMO=.685, Bartlett's sphericity test approximation χ2=200.646(df=3, Sig=.000).

Measurement scale. 1 = Not at all, 5 = Very much.

As a result of the analysis performed, 1 factor was extracted, and it demonstrated the variance explanatory power of 68.52% of the total variance. In order to determine the conformity of the factor analysis model, the Bartlett's sphericity test and the Kaiser-Meyer-Olkin's sample conformity test were conducted, and consequently, the approximate χ2 of Bartlett's sphericity test was 200.646 and the degree of freedom = 3, indicating that the 'correlation between variables is at 0.1% level' as a null hypothesis that the matrix is 0' was dismissed.

As for the sample conformity test of KMO, the factor analysis may be performed when it is 0.5 or more, and it may be said that it is conforming for factor analysis when it is 0.7 or more, and in this study, it was appropriately presented as .685. The common value demonstrating the variance explanatory power of all factors of individual questions turned out to be .626-.738. The factor load related to the influence of the factor component variables was presented as high from 0.791 to 0.859, which suggested that the scale was conforming.

Based on the analyzed results as in the above, the extracted factors were granted names, and they were named the 'tourism related satisfaction' in consideration of the conceptual relevance of the variables.

The factor variance explanatory power turned out to be 68.519%, and the factor mean value turned out to be 4.05. The factor reliability turned out to be 0.767, and there was no variable which caused the factor reliability to decline.

4.3. Results of the multiple regression analysis

The multiple regression analysis was performed to examine and understand the effect of the tourism constraints factors(environmental constraints on tourism sites, internal constraints, local fear constraints, time constraints, economic environment constraints, and information/health constraints) on the tourism related satisfaction. As for the tourism related satisfaction(3 variables), the total scale of the variables measuring the concept was used, and as for the analytical method, the input method to identify all statistics of the input variables was used, and the results were obtained as illustrated in <Table 4>.

As a result of the analysis, R2(Adjusted R2), which demonstrates the explanatory power of the tourism constraints factor for the tourism related satisfaction, turned out to be 0.154(0.133), and the F statistic was 7.287, which turned out to be statistically significant at p<0.001 level. The Durbin-Watson statistics, which is an index of the independence of error, may be said to be more conforming as it nears 2, yet it may be said that it is relatively conforming as it turned out to be 1.79.

As a result, the explanatory power of the tourism constraints factor for the satisfaction turned out to be 15.4% in total, and it also turned out to be statistically significant(F=7.287, df=6, p<.001). Among the 6 tourism constraint factors, the tourist destination related environmental constraint(t=2.831, p<.01), internal constraint(t=1.993, p<.05), economic and environmental constraint(t=2.806, p<.01), and the information/health constraint(t=-4.754, p<.001) factors turned out to be statistically significant.

In terms of the significance of the standard regression coefficient, the tourism related environmental constraint(β=.193), internal constraint(β=.143), and the economic and environmental constraint(β=.185) have a positive(+) effect on the tourism related satisfaction, while the information/health constraint(β=-.355) factor turned out to have a negative(-) effect. Among the factors positively influencing the tourism related satisfaction, the tourist environment constraint factor turned out to have had a slightly higher influence, and the information/health constraint factor turned out to have the highest influence although it was a negative relationship of influence.

Table 4. Results of the multiple regression analysis for the tourism constraint and the tourism related satisfaction.

Dependent variable	Independent variable	Non-standardized coefficient		Standardized coefficient	t value	p-value
		B	Standard error	β		
Tourism related satisfaction	(Constant)	3.592	.206		17.451	.000
	Tourist destination related Environmental constraint	.130	.046	.193	2.831	.005**
	Internal constraint	.125	.063	.143	1.993	.047*
	Local fear constraint	-.050	.047	-.075	-1.070	.286
	Time constraint	.062	.045	.086	1.377	.170
	Economic environmental constraint	.091	.032	.185	2.806	.005**
	Information/health constraint	-.287	.060	-.355	-4.754	.000***

Note.: R2=.254, Adjusted R2=.233, df=6/338, F=17.287, sig.=.000. / *= p<.05, **= p<.01, ***= p<.001.

   Measurement scale: 1=Not at all, 5=Very much.

Gathering the results of the analysis performed as in the above, it was demonstrated that the local fear constraint and the time constraint did not have a significant effect on the tourism related satisfaction. It is also apparent that even while the tourist destination related environmental constraints, internal constraints, and the economic and environmental constraints all demonstrate the same results which have a significant effect, and have a positive effect on the tourism related satisfaction, there is a slight difference in the relative degree of influence by each variable. That is, the tourism related satisfaction is more influenced by the economic and environmental constraints than the internal constraints, and it demonstrates that the tourism related satisfaction is more influential, which demonstrates that the tourism related satisfaction is higher as the tourist destination related environmental constraints, internal constraints, and the economic and environmental constraints are higher.

Meanwhile, since the information/health constraints have a negative effect on the tourism related satisfaction, it is demonstrated that the higher the information/health constraints, the lower the tourism related satisfaction.

5. Conclusion

The tourism industry is one which is strongly influenced by the internal and external environment, such as the social environment, health environment, political environment, the economic environment, the natural environment, and the psychological state of the tourist as well as the individual environment of the tourist. In particular, the tourism related products are the ones with a high elasticity of demand and are also highly influenced by various tourism constraints, and in particular, the tourism related products are the ones which are subject to many changes

or constraints for the domestic and international health and economic environment including infectious diseases, travel costs, exchange rates, and oil prices.

Accordingly, the purpose of this study is to examine the tourism constraints influencing the tourism industry, and also examine the effect of tourism constraints on the tourism related satisfaction, so as to overcome or reduce the tourism constraints, further to identifying the factors which may be used to elevate the tourists' tourism related satisfaction and use them for the tourism product development and tourism marketing.

In order to achieve the purpose of this study as such, the factors were derived based on the factor analysis performed in regards to the variables of tourism constraints and tourism related satisfaction, and the multiple regression analysis was performed to examine and learn about the relationship of effect between the tourism constraints and tourism related satisfaction, thereby reaching the following conclusion.

First, as a result of the exploratory factor analysis performed, the health and cleanliness (sanitation) turned out to be the variables which have had the greatest influence on the tourism constraints, followed by safety, climate and weather. That is, it may be said that the security and guarantee of health, hygiene, and safety would practically determine the success of a tourist destination. Hence, as for the tourism revitalization and the sustainable development in the aftermath of the pandemic, thorough preparations for and against infectious diseases which may recur and the plans for hygiene and cleanliness of tourist destinations, and an environment for achieving political and economic stability and safety are required.

Second, based on the analysis of the causal relationship between the tourism constraints and the tourism related satisfaction, the tourist destination related environmental constraints, internal constraints, and the economic and environmental constraints turned out to influence the tourism related satisfaction in a positive direction, and he information and health constraints also turned out to have a negative effect on the tourism related satisfaction. That is, it means that, after going on a tour in the case of overcoming tourism environment, internal and economic and environmental constraints, the satisfaction rises, and it declines if there are the information and health constraints. Furthermore, it is apparent that the tourism related satisfaction is most influenced by the tourist destination related environmental constraints. Hence, when planning and developing the tourism related products after the pandemic, it is necessary to investigate and check on whether the tourist destination may respond to and treat infectious diseases, possibility of occurrence of abnormal climates such as El Niño, and countermeasures, etc.

This study was conducted during the pandemic, and hence, it was difficult to collect a sample which satisfies the purpose of the study. Hence, future studies ought to be conducted based on the diverse and representative samples after the pandemic is over.

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7. Appendix

7.1. Authors contribution

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

Regulations

A Study on the Selection of the CCTV Location for Crime PREVENTION

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Abstract

Purpose: The purpose of this study is to discuss the theoretical basis and location selection method for CCTV, which has recently been spotlighted as an important means of crime prevention.

Method: For the purpose of the study, this study attempted to explain the relationship between CCTV and crime prevention. More specifically, this study attempted to explain the theory of criminology related to CCTV. In particular, we tried to explore the possibility of crime prevention effects of CCTVs, focusing on the discussion of classical criminology and neoclassical criminology, not positivist criminology based on the criminality of criminals. In addition, this study attempted to understand existing studies that analyzed the effect of CCTV on crime occurrence and sense of safety. In addition, this study examined the existing domestic research on how to select the location of CCTV installation and introduced an example of a comprehensive study of one of the existing studies.

Results: The theory of criminal opportunity, called neoclassical criminology, consists of lifestyle theory, daily behavior theory, CPTED, rational choice theory, and situational control theory. The theory of criminal opportunity is more interested in the situation in which a crime occurs than in the criminality of a criminal. In particular, it emphasizes the monitoring ability to grasp criminal behavior. Typically, CCTV is a means of strengthening surveillance. Accordingly, CCTV has established itself as a key means of preventing crime. Most CPTED programs use CCTVs. In existing effectiveness studies, CCTV was also found to reduce crime and crime fear. Accordingly, some studies emphasize the importance of selecting the location of CCTV installation and provide guidelines for how to select the location of CCTV installation. This study attempted to introduce a new guideline recently proposed.

Conclusion: Selection of CCTV installation locations is an important issue for crime prevention and increased satisfaction of local residents. This study attempted to introduce theories, existing studies, and location selection guidelines related to CCTV. There is a need to maximize its effectiveness by installing CCTVs, which are in charge of an important function of strengthening surveillance, in suitable places.

[Keywords] CCTV, Neo-Criminal Theory, CPTED, Place, Crime Prevention

1. Introduction

CCTV is recognized as an important crime prevention means that can strengthen surveillance and secure a sense of safety[1][2][3][4][5][6][7][8][9][10]. In most CPTED programs, CCTV is used as a key surveillance strategy[6][7][10][11][12]. CCTV can occupy an important position in crime prevention because it is based on the theory of neoclassical criminology. Neoclassical criminology or crime opportunity theory, starting from classical criminology that emphasizes free will and rational choice, criticizes positivist criminology based on the criminality of criminals and emphasizes the importance of criminal situations and opportunities[13].

Most Unlike positivist criminology, which is being discussed around the propensity of criminals, criminal opportunity theories pay attention to the situation of crime occurrence[6]. This is because

crime occurs in criminal opportunities where there are criminals with motives, victims or victims suitable for crime damage, and supervisors(police, local residents, CCTVs, etc.) who can supervise and control the criminal's actions. Therefore, it is expected that the occurrence of crimes can be minimized if the situation of criminal opportunities is properly controlled[6].

Among the crime opportunity theories, situational crime prevention theory proposes various crime opportunity reduction techniques that can control the structure of crime opportunities by combining rational choice theory, routine activity theory, crime prevention theory through environmental design, and problem-oriented police theory[6]. The crime occurrence situation control technique through CCTV is one of the representative crime opportunity reduction techniques[12]. The crime opportunity reduction technique refers to a technique for blocking crime opportunities by properly controlling the situation in which a crime occurs[6][7]. So far, a total of 25 crime opportunity reduction techniques have been proposed, including 1)Increase the Effort of criminals, 2)Increase the Risk of Arrest, 4)Reduce the Rewards, and 5)Remove excuses for crimes[12].

As a result, it is assumed that CCTV installation among crime opportunity reduction techniques can increase the risk of arrest for criminals and reduce the possibility of crime by strengthening the monitoring function of protected objects[7][9][10][14]. In addition, by installing CCTVs, it is possible to provide psychological stability that ordinary residents can safely live their daily lives[15]. In general, police patrol activities are representative as a function of monitoring criminals' behavior, and a neighborhood monitoring system that strengthens monitoring among local residents is also proposed. However, such formal and informal surveillance activities have temporal and physical constraints. In other words, CCTV, which can act as the eyes of 24-hour monitors in fixed places, has become an important policy alternative to suppressing the occurrence of crimes because it is difficult to supervise 24 hours a day and there is a limit to securing criminal evidence[9]. In other words, the installation of CCTV for crime prevention has been emphasized as a new way to strengthen protective capacity, one of the core elements of criminal opportunities[7][9]. CCTV for crime prevention can be monitored and recorded 24 hours a day with the use of mechanical devices, and technological advances include 360-degree rotation, remote control, image quality improvement, and voice function installation[7]. CCTV is mainly responsible for monitoring in fixed places, so it is expected to contribute to suppressing criminals' behavior and securing stability by maximizing monitoring by expanding the scope of monitoring through continuous CCTV increase.

Recently, CCTV has been proposed as a representative method of crime prevention activities through environmental design[13]. It is argued that crime prevention policies through environmental design can reduce crime through urban environmental design[11][16][17]. In particular, many crime prevention policies using CPTED have been proposed in countries such as the UK, Australia, and Europe[18]. Since the 2000s, crime prevention policies using CPTED have been in the spotlight in Korea, and CPTED has been applied under various names such as the Safe Village Creation Project, the Safe Return Road Creation Project, etc[9]. In particular, strengthening the supervisory function, one of the core concepts of CPTED, is mainly achieved by increasing the monitoring ability using CCTV. According to the CPTED theory, CCTV is used as a basic method for joint monitoring and setting up defense spaces, and the need for installation is emphasized. In other words, even in CPTED theory, CCTV is being used as a useful way to control the situation of crime occurrence[7][9].

As a result, in order to maximize the effectiveness of CCTVs in crime prevention, this study intends to discuss the evidence theory of CCTVs, existing CCTV research, and methods of setting appropriate places for CCTV installation. In particular, the selection of CCTV installation locations is a very important policy issue as it is related to the demand of local residents. The selection of existing CCTV installation sites was often based on political judgment, and the selection method was criticized for being ambiguous. Therefore, this study aims to analyze and introduce studies on the development of objective indicators for CCTV location selection.

2. Crime Opportunity Theory and CCTV

The main discussion of criminal orientation theory explains that the biological or psychological

characteristics or tendencies acquired in the process of socialization of criminals from birth have a major influence on crime counseling[6][9]. The theory of criminal orientation is mainly in line with the discussion of positivist criminology, and positivist criminology understands that criminals have criminal tendencies or characteristics unique to criminals, which increases the likelihood of crime. Representatively, Lombroso, an early researcher among biological crime theorists, saw that criminals are likely to commit criminal acts such as murder, robbery, theft, and violence as they have primitive aggressive biological characteristics. In particular, the logic was that if born as a natural criminal, there is a high possibility of becoming a criminal, so complete isolation from society or child reproduction should be prevented[8].

On the other hand, the psychological crime cause theory argues that there is a difference in the likelihood of crime occurrence due to the influence of the criminal's personality, cognition, learning, and unconsciousness. Typically, ruthless criminals, such as serial killers, often show psychopathic tendencies in personality, and it is understood that their personality characteristics increase the likelihood of crime. In addition, the experience of violence and abuse in childhood allows cognitive problems and learning about violence, which consequently increases the likelihood of committing negative behavior even in adulthood[19].

Sociological crime cause theory also understands that various social factors such as home, community, school, and friends act as sociological crime-causing factors for individuals, which strengthens criminality and causes frequent crime occurrences in specific regions. The sociological crime cause theory explains the occurrence of crimes at the individual and collective levels. The theory of criminal causes at the individual level is mainly interested in factors such as learning, tension, bonding, and stigma, and understands that these factors promote or control crime occurrence. Among the representative sociological crime cause theories, self-control theory is a theory that supports the theory of criminal orientation. The theory of self-control argues that differences in self-control are determined by parents' parenting behavior in childhood, and that when they exceed a certain age, self-control permanently affects a person's life, and the lower the self-control, the higher the likelihood of crime. On the one hand, group-level crime cause theorists understand that there are regional differences in crime occurrence due to social structural characteristics or cultural characteristics, and representatively, social dissolution theory, subculture theory, and anomie theory were highlighted as group-level crime cause theories[19].

Unlike positivist criminology theories that support criminal disposition and determinism, discussions emphasizing the importance of criminal opportunities and situations emerged from classical criminology[6]. These theories, called neoclassical criminology, accept the basic assumptions of classical criminology and argue that humans are rational beings with free will and reasonably calculate profits and losses in criminal opportunities and move on to crime[6][12]. These theories emphasize the importance of the situation in which a crime is to occur[7]. In other words, crime occurs only when the existence of a criminal opportunity exists, rather than due to the criminal's tendency, and most criminals recognize it as a reasonable existence to decide whether to proceed to a crime in a criminal opportunity situation[20]. As evidence supporting this logic, crime occurrence occurs mainly in specific areas of the residential area, and removing the crime-causing environment and conditions of the residential area significantly reduces crime occurrence[6].

In particular, among the various ways to block criminal opportunities, increasing the "eye of surveillance" to monitor criminal behavior suppresses the likelihood of crime or reduces crime eventually[6][11][13][20]. Lifestyle theoy[21], routine activity theory[20], CPTED(Jeffrey, 1971 Newman, 1972), rational choice theory[13] and situational crime prevention[6]. These theories, rooted in classical criminology, argue that crimes are more likely to occur in synchronized the motivated criminals, the attractive targets, and the absence of supervision, and that criminal tendencies are insignificant[6][20]. In other words, opportunities and situations for crime occurrence are key factors in crime occurrence. The theory of criminal opportunity is also called the victim theory, and based on these theories, measures to prevent crime victimization can be derived for people with high frequency of crime victimization. The theory of criminal opportunity suggests quite practical alternatives to the policy development of criminal justice agencies for crime prevention[6]. In particular, CCTV is one of the

representative alternatives to implement a crime prevention policy by applying the crime opportunity theory[13]. Crime prevention activities are being conducted focusing on the situation of criminal opportunities in which crimes occur compared to the tendency of criminals. In particular, CCTV for crime prevention is in the spotlight as a way to contribute to reducing opportunities for crime occurrence and suppressing criminals[6][8].

Interest in the situation of crime occurrence is based on neoclassical criminology rooted in classical criminology. Cesare Beccaria, dubbed the father of criminology in a book titled "On Crime and Punishment," argues that all humans have free will and reasonably can weigh the benefits and losses of criminal acts[19]. In addition, since humans instinctively tend to avoid pain and seek pleasure, it was considered that crime suppression is achieved if the pain through crime counseling is large. Accordingly, Beccaria argued that criminal behavior can be suppressed by strengthening(fast, strict, and certain) official punishment[19]. Classicist criminology was later developed by scholars into deterrence theory and criminal opportunity theory[19]. The theory of criminal opportunity, which focuses on the situation of crime occurrence, is more interested in preventing crime by blocking criminal opportunities rather than punishing criminals[6]. Based on the discussion of the theory of criminal opportunity, the installation of CCTV is expected to prevent the situation of crime by strengthening the function of monitoring the behavior of criminals.

The rational choice theory is a representative theory that provides the theoretical logic of neoclassical criminology[13]. The rational choice theory argues that based on utilitarianism and economic choice theory, most criminals have normal thinking, are less likely to be arrested, and make rational choices about what has a lot of profitable benefits[13]. Therefore, it is argued that crimes are given different environments or criminal opportunities in each case, and criminal acts can be explained based on the criminal's rational choice. The rational choice theory cites most of the theoretical arguments of classical criminology, but differs in the degree of human rationality[13]. If classical criminology is based on complete rationality, rational choice theory recognizes incomplete rationality[13]. This is understood to be due to differences in perception of criminal situations in the process of criminal selection because individuals have different learning and experiences[13]. It is understood that criminals commit crimes when they perceive themselves to be incomplete but reasonable rather than based on a complete understanding of the criminal situation in calculating profits and losses from criminal acts. Therefore, criminals reasonably chose criminal acts, which explains that humans can choose their actions despite their imperfections, contrary to the claims of positivist criminologists[13][19]. The decision-making of criminals who choose a particular time, place, and a particular crime is complexly listed and there are factors that structure choices according to individual crimes[13].

Unlike classical criminology, rational choice theory emphasizes the importance of criminal situations in which crimes can occur, and criminals confirm that the surrounding conditions are in place to complete their criminal acts and move on to crime. The reason why a thief breaks into a crime prevention device or a household where surveillance is neglected and commits theft is because if the crime prevention device is installed, the likelihood of detection increases and the risk of arrest increases. It also explains that criminals who commit sexual assaults tend to meet their sexual desires in the face of neglecting surveillance by people around them against the elderly and children with poor resistance. In other words, criminals consider the number of objects to be committed and the possibility of access to them, identify the degree of familiarity with the selected crime method, and calculate the financial benefits that can be obtained through the crime. It is also explained that criminals choose criminal acts in consideration of the risk of arrest and potential physical risks by calculating the degree of proficiency required to commit a crime and the time required to commit the crime.

The lifestyle theory is evaluated as the first systematic theory of crime victimization[21]. Lifestyle Theory explains that everyday activities, including both vocational and leisure activities such as work and school, can affect the possibility of criminal victimization[21]. The reason why lifestyle can affect crime victimization is that people can influence their temporal and spatial proximity to criminals due to their daily lifestyle, which increases the likelihood of exposure to criminals[21]. This is also because it affects attractiveness as an object of crime and also affects the possibility of being protected from crime. These are called the four major places of crime victimization, such as proximity to criminals,

exposure to crime risk areas, target attractiveness, and the absence of protection[21]. Hindelang and his colleagues explain that people differ socially in lifestyle due to structural constraints and individual collective responses or adaptations to various role expectations[21]. The lifestyle model of crime damage is said to determine the type of companionship and daily activities in their professional and leisure activities because individuals' demographic characteristics(gender, race, income, education, occupation, age, and marital status) involve structural constraints and expectations[21].

Routine activity theory is a representative theory of criminal opportunity along with lifestyle theory[20]. Cohen and Felson argued that the increase in crime rates in the United States in the 1960s and 1970s could not explain the change with existing criminological theory[20]. They explain that the reason for the continued increase in the crime rate of home invasion despite the decline in the U.S. unemployment rate and increased income is due to changes in Americans' daily behavior rather than traditional criminal explanations based on criminality[20]. After World War II, American society increased women's entry into society, resulting in the absence of routine surveillance at home, and the development of technology led to an increase in expensive electronics, resulting in an increase in home invasion crimes[20]. In other words, changes in routine activity have further increased the possibility of crime victimization. Routine activity theory explains that potential criminal victimization increases the risk of victim due to visibility, accessibility, attractiveness, and lack of protection[20]. Routine activity theory is a structure of opportunities for crime to occur, resulting in three factors(the Motivated offenders, the suitable targets, and the absence of available supervisors)[20]. It is argued that when cattle converge in a particular time and space, the likelihood of crime occurring increases without changing or increasing the structural conditions of synchronized criminals[7][20]. Therefore, it is explained that if an individual has a routine dismissal that frequently approaches places or sections where criminal opportunities are likely to combine, the probability of being subject to criminal victimization increases[20]. The elements of the criminal opportunity situation emphasized in the routine activity theory consist of synchronized criminals, attractive crime targets, and the absence of guardians. In particular, it is the absence of a guardian that is related to CCTV for crime prevention[8]. The absence of available guardians means the absence of family members or local residents, police, and physical supervisory devices to protect property or people[20]. In other words, the absence of a guardian reduces the opportunity to monitor the criminal's behavior, increasing the likelihood of crime victimization.

When crime is marked with red dots on the map, it can be seen that crime occurs very disproportionately in most areas. Areas where crimes occur a lot tend to gather very densely with red dots, which is called a crime concentration phenomenon. Sherman and Weisburd proved the phenomenon of crime concentration by identifying that 50% of all reported calls were made in 3% of the city area[22]. In other words, regional characteristics act as the cause of crime occurrence, and the importance of concepts such as informal social control in the local community was emphasized as a factor of crime occurrence. The police are also implementing police policies based on the phenomenon of crime concentration, typically hotspot police activities. Hotspot police activities are an effort to reduce crime occurrence by intensively deploying police forces in areas where crimes occur a lot. As a result of previous studies, Hotspot police activities are evaluated as the most effective police crime prevention policy[23]. The logic of suppressing crime through intensive patrol activities is in line with the discussion of crime opportunity theory. This is because official surveillance capabilities can be strengthened through intensive police patrol activities. Intensive installation of CCTVs in crime-prone areas can also be expected to have the same effect as intensive patrol activities by the police[8]. This is because if CCTVs are installed in a number of specific areas, monitoring and crime suppression functions can be expected.

3. Effectiveness of CCTV on Crime and Fear

The question of whether CCTV has a crime prevention effect can be linked through the crime opportunity theory and crime-related theories discussed above. In particular, in the theory of criminal

opportunity, it is explained that the effect of crime prevention can be expected by strengthening surveillance. According to rational choice theory, crime is assumed to occur accidentally by ordinary and rational people, not by special tendencies, and crime occurs after the criminal considers both personal factors(money, revenge, thrill, entertainment) and situational factors(protection level and police force)[6]. Therefore, in order for criminals to effectively suppress crimes, they block criminal opportunities by increasing the cost of profits and losses through crimes[7][8]. Here, CCTV installation becomes a way to instill the perception that the cost increases due to the reduction of profits through criminal acts and the increase in the likelihood of detection[8]. In other words, in the process of rational selection, a criminal can decide whether to continue or stop the crime depending on the existence of CCTV, so if CCTV exists, the possibility of crime can be lowered[7][8][24].

Crime opportunity theory basically proposes to strengthen the monitoring function to prevent crime. CCTV is a representative monitoring reinforcement plan, so crime prevention can be expected through CCTV. In general, policies to strengthen public surveillance, such as strengthening police patrols or installing CCTVs, belong to typical situational crime prevention strategies[25][26]. Accordingly, CCTV installation can lead to psychological stability in criminal activities[15]. CCTV is used as a basic method for joint monitoring and establishment of defense spaces, and the necessity of installation is emphasized. Surveillance can be strengthened through CCTV installation, which can act as a technique to control criminal opportunities and criminal situations[6].

The effectiveness of CCTV refers to the effect of reducing the crime incidence rate in the area and improving the fear of crime damage or the safety of local residents through CCTV installation. Existing previous studies have limitedly recognized the effectiveness of CCTVs, but have not reached a clear conclusion.

The UK is the most active place in research on crime control of CCTV. Brown attempted to verify the crime prevention effect of CCTV in the Kings Lynn and Newcastle regions of the UK[27]. In this study, a total of 16 cameras installed in a commercial facility located in the center of the city of Newcastle and intrusion theft decreased in areas with a wide range of CCTV surveillance[27]. However, as time passed, the crime prevention effect of vehicle theft crimes rapidly decreased. In addition, Brown conducted an experimental study on the effect of preventing vehicle theft due to CCTV installation in the Kings Lynn area[27]. As a result of the experiment, the crime prevention effect was strong at the beginning of CCTV installation, but the effect was found to decrease sharply over time, indicating that the crime prevention effect of CCTV was limited[27]. Next, Short and Ditton analyzed criminal statistics data for two years after CCTV installation to analyze the effectiveness of CCTVs installed in Aidrie City, Scotland[28]. As a result of analyzing criminal statistics data, it was found that the total number of crimes in Aidrie City decreased by about 21% after CCTV was installed[28]. In particular, residential intrusion theft and vehicle-related theft decreased by about 48%, and arson decreased by 19%. However, unlike Brown's study, no decrease in CCTV effectiveness over time was found[28].

Next, looking at a study in the United States, Welsh and Farrington meta-analysis of 22 existing CCTV studies and concluded that the CCTV crime prevention effect was partially recognized but not significant[10]. Likewise, in a study by Gill and Springs, CCTV was found to have only limited crime prevention effects[29]. Meanwhile, Ratcliffe and his colleagues showed that public CCTV reduced the overall crime rate by 13% in the Philadelphia area and reduced misdemeanors such as wind disturbance by an average of 16%, resulting in that CCTV is more effective in misdemeanors than serious crimes[30]. Similarly, McLean and his colleagues showed that CCTVs generally help reduce crime rates, but have greater influence on disorderly behavior than felony[31].

The results of a domestic study on the effectiveness of crime suppression according to CCTV installation are as follows. First of all, Park Hyun-ho and his colleagues conducted a quasi-experimental design to verify the crime suppression effect of CCTVs installed in Gwangmyeong-si, Gyeonggi-do[32]. According to the results of the study, it was reported that the number of robbery and theft crimes that occurred in 2009 when CCTVs were installed decreased by about 47% compared to 2008 and that no crime transition occurred[32]. Similarly, many of Korean scholars found the deterrent effects of CCTV on crime and disorder[8].

4. The Importance of CCTV Installing Place

Criminal risk factors are factors that increase the occurrence of crimes. Crime prevention can be made possible by identifying and blocking these factors that enhance the risk of crime occurrence. Existing crime opportunity theories present important criteria for identifying local crime risk factors. It is expected that crime occurrence can be suppressed and controlled appropriately by blocking and minimizing local crime risk factors. In addition, from the perspective of social dissolution theory, efforts are required to improve the decline in social control of the community that causes crimes. However, it is difficult for the police to be in charge of identifying and blocking crime-causing factors in such areas alone. Accordingly, many existing police agencies are trying to block criminal opportunities through the cooperation of local residents after receiving budget support from local governments. Representatively, the crime prevention environment report project, which has recently been named as the creation of a safe village, is an example. Existing criminal studies had limitations in properly verifying the effectiveness of crime prevention environment creation projects that require a huge budget. Many studies relied on cross-sectional data and attempted to verify its effectiveness by looking at the simple relationship between local residents' perceptions and CPTED perceptions. However, the results of time series analysis and longitudinal studies on crime control of crime prevention environment creation projects are being published one after another, and these studies prove the effectiveness of crime prevention environment creation projects, including CCTV installation[8][9].

In particular, the recent crime risk assessment has received a lot of attention in practice such as the police. Perhaps the reason reflects the recent increase in citizens' interest in safety. It is expected that customized police activities in the local community will be possible at the police level through criminal risk assessment. In addition, it is expected to help improve the rationality and objectivity of policy decisions that have been dominated by complaints from local residents in the existing new CCTV installation. In particular, huge local and state budgets are being invested in environmental projects to prevent crimes by local governments, and it is important to secure priorities for new CCTV installations through appropriate crime risk assessment and diagnosis. Therefore, it is necessary to prioritize objective and reasonable location selection by applying the crime risk assessment method in CCTV location selection. CCTV installation for crime prevention, which is most preferred as a way to strengthen surveillance, is difficult to meet all the demands of local residents in the process of distributing limited resources. Most citizens hope to install new CCTVs for crime prevention in right-wing crime areas around their residence, but it is difficult to meet all new demands due to financial limitations. However, conflicts between local residents and complaints about local governments are expressed at a time when new CCTVs are not installed in other areas while accepting requests from certain local residents[8]. In order to minimize complaints in such communities and persuade them reasonably, it is required to prepare a plan to measure the priorities through objective indicators when installing new CCTVs for crime prevention. In addition, since the ultimate purpose of CCTV for crime prevention is to maximize the effect of crime prevention, it is necessary to set the place with the highest probability of crime as a priority. Accordingly, standards for determining priorities for installation places for new installation of CCTVs for crime prevention are required. However, there was a lot of controversy over the priority criteria for the new CCTV installation because no clear indicators were made. Accordingly, guidelines for prioritizing CCTV location selection for new crime prevention through crime risk assessment are required[8].

Risk assessment conducted for the purpose of crime prevention is highly effective in that it can be a value criterion for identifying security demand and determining the priority of financial input. In particular, risk assessment has various advantages in selecting the location and prioritizing installation of CCTV for crime prevention. First, since the new CCTV installation for crime prevention is aimed at identifying the possibility of crime in the future and obtaining crime prevention and investigation information, it is necessary to select areas with high probability of crime first. Therefore, the priority of installing CCTV for crime prevention can be a convincing criterion when set based on the evaluation of crime risk. Second, the existing CCTV installation standards for crime prevention were virtually unclear and not scientific. In addition, in many cases, the priority of CCTV installation tended to be determined according to the demand for civil complaints, resulting in frequent complaints and conflicts. Therefore,

if guidelines for prioritization are provided based on scientific methods, it will reduce complaints from local residents and reduce the political burden on the competent ministries and heads of local governments. Finally, in addition to the crime prevention effect, the new installation of CCTV for crime prevention is expected to have a positive effect on the reduction of crime fear and disorder behavior among local residents. Therefore, if the level of crime fear of local residents is identified and reflected in determining the priority of new CCTV installations, it will be possible to obtain impositional effectiveness other than crime. Existing criminal risk assessment includes subjective perceptions such as crime fear in the checklist, so such effects can be expected[8].

5. The Guideline for Effective Place to Install CCTV

There are not many studies on the location of CCTVs at home and abroad. In the case of the United States, the Washington DC Control Center Ordinance requires local residents to participate and analyze crimes to select locations, prioritizing CCTV installation locations or hot spots for low-income families. In the case of the UK, the National Strategy of CCTV reports insisted on standardization of CCTV location selection. The Surveillance Camera Code of Practice also discussed the standardization of CCTVs. In the case of the city of London, it is recommended to install CCTVs at locations with high CCTV monitoring effects. Research related to CCTV in Korea is generally limited to specific areas(e.g., bus stops, convenience stores, subways, apartments, etc.) and focuses on developing criminal risk assessment methods and tools to install CCTVs. In addition, there are studies claiming CCTV installation as part of CPTED research. Until now, there have been three academic studies that are directly related to the CCTV installation guidelines[8][33].

Research related to CCTV location selection seems to suggest a more specific and objective method for domestic research than overseas research. Accordingly, there is a need to come up with a plan to internationalize domestic CCTV location selection standards. The figure below is the most recently presented guideline for location selection for CCTV installation[8]. It is understood that a method of selecting the most comprehensive and practical CCTV installation location has been proposed when comparing domestic and foreign countries. As shown in the figure, it is a guideline that can derive objective scores for selecting CCTV installation locations by analyzing crime, population analysis, CPTED analysis, and psychological conditions of local residents[8].

Table 1. Guideline for crime preventive CCTV installing place suggested by Yun et al(2017).

Category	Question	Value
Crime analysis	Geo-pros(seven major crime occurrence in the area)	SD(1 to 3)
	Distance from near crime hotspot(200m)	◎ Over ⑤ In
	Distance from the house of sexual criminals(200m)	◎ Over ⑤ In
Area analysis	Whether or not the candidate place for installing CCTV is in front of the gate of elementary school or female school	◎ No ⑤ Yes
	Whether or not the candidate place for installing CCTV is in front of the gate of male school	◎ No ③ Yes
	Whether or not the candidate place for installing CCTV is the resident area consisted of the multi-family houses	◎ No ⑤ Yes
	Population density in the candidate place	SD(1 to 3)
	The ratio of the female population in the candidate place	SD(1 to 3)

	The ratio of the elderly over 65 years old in the candidate place	SD(1 to 3)
	The ratio of minors in the candidate place	SD(1 to 3)
	The ratio of single-person households in the candidate place	SD(1 to 3)
	The ratio of public recipients in the candidate place	SD(1 to 3)
	The ratio of foreign population in the candidate place	SD(1 to 3)
	The number of entertainment establishment directed by the police	SD(1 to 3)
	Social cohesion in the candidate place	Survey(1 to 3)
	Residents' participation in community organizations	Survey(1 to 3)
	Informal social control in the candidate place	Survey(1 to 3)
CPTED analysis	The number of the floating population	Observation(1 to 3)
	The number of road intersection	Observation(1 to 3)
	Distance from police station or police box(200m)	◎ In ③ Over
	Distance from self-defense guard post(200m)	◎ In ③ Over
	The number of entering and exiting road	Observation(1 to 3)
	Bus stop or subway entrance	Observation(1 to 3)
	The level of the natural monitoring of the structure of surrounding buildings	Observation(1 to 3)
	The level of the natural monitoring of the arrangement of surrounding buildings	Observation(1 to 3)
	The brightness of road lights in the night	Observation(1 to 3)
	The level of blind spot	Observation(1 to 3)
	Distance from neighborhood living facilities(200m)	◎ Over ③ In
	The number of night passengers	Observation(1 to 3)
	The level of disorder in the night	Observation(1 to 3)
	The level of cleanliness in the area	Observation(1 to 3)
Psychological analysis	Residents' perception of the trend of crime in the area	Survey(1 to 3)
	Residents' fear of crime in terms of affection	Survey(1 to 3)
	Residents' fear of crime in terms of perception	Survey(1 to 3)
	The level of residents' preference for CCTV	Survey(1 to 3)

6. Conclusion

To This study attempted to comprehensively summarize the evidence theory, effectiveness study, and guidelines for selecting CCTV installation locations, which are recently recognized as the most important means of crime prevention. As shown in the research results, CCTV is one of the important strategies for crime prevention. Although CCTV is not complete, it seems to have a crime prevention effect and help secure a sense of safety for local residents. The reason CCTV is helpful in preventing crimes is that it enables strengthening of surveillance emphasized by the existing theory of criminal opportunities. Criminals reasonably calculate profits and losses from crimes because CCTVs play a role in increasing losses and have the effect of strengthening surveillance. As CCTVs are expected to play an important role in crime prevention, CCTVs are being installed in many regions. However, it is necessary to prioritize the location of CCTV installation through objective analysis. However, the selection of the location of the existing CCTV installation has a limitation that it has been greatly influenced by political judgments and complaints from local residents. Accordingly, studies on the method of selecting the location of CCTV installation were recently conducted. In particular, the recent guidelines for selecting the location of CCTV installation introduced in this study show that it is necessary to collect and analyze comprehensive and objective data in CCTV installation. Therefore, in the future CCTV installation, a comprehensive and objective selection method should be proposed, as suggested in this study.

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8. Appendix

8.1. Authors contribution

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

Regulations

Crime Prevention by Strengthening REGULATIONS on Drunk Driving

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Abstract

Purpose: The purpose of this study is to discuss the countermeasures against drunk driving regulations in terms of crime prevention because drunk driving is not a simple traffic crime but a potential murder.

One methodology would be to raise the punishment for drunk driving and to improve the public's awareness and conduct regular traffic accident prevention education so that fundamental problems can be solved and have high efficiency and normative power. In Korea, the 'Act on the Aggravated Punishment of Specific Crimes, etc.' and 'Road Traffic Act' were amended in Korea following the case of 'Yoon Chang-ho', who died in a drunk driving accident in 2018. Drunk driving is a very dangerous behavior, as it can endanger your life as well as the lives of others. Even if an accident does not occur, such an act is a violation of the Road Traffic Act and therefore carries criminal responsibility. In terms of general crime prevention, the penalties for drunk driving are becoming stricter than in the past. In the improved system, even if the blood alcohol level is 0.03% or more and less than 0.08, imprisonment for not more than one year or a fine of not more than 5 million won is imposed. In the case of two or more violations of the strengthened regulations, imprisonment for not less than 2 years and not more than 5 years, or a fine of not less than 10 million won and not more than 20 million won. What used to be a three-out was changed to a two-out for drunk driving. However on November 25, 2021, the Constitutional Court ruled that the provisions of the Road Traffic Act, which required uniform and aggravated punishments for drunk driving more than twice, were against the Constitution(Constitutional Court 2021.11.25, 2019Hunba 446, etc.). In addition, if you injure a person while driving, you will be punished by imprisonment for not less than 1 year and not more than 15 years in prison, or a fine of not less than 10 million won to not more than 30 million won(Before the amendment, in case of death while driving under the influence of alcohol, he was sentenced to fixed-term imprisonment of more than one year). Drunk driving accidents can lead to criminal punishment, administrative sanctions, and even civil lawsuits. Keep in mind that drunk driving can be a potential killer on the road. Even if you didn't harm anyone, just drinking and driving can be a big hit in society.

Method: Injuries and deaths due to drunk driving are on the rise. As a countermeasure against this, the standards and level of punishment for drunk driving are being strengthened. First, let's look at the legal punishment for drunk driving through the laws related to drunk driving. Second, we examine the severity of the damage caused by drunk driving through statistics such as drunk driving accidents, injuries, and deaths in current Korean society. Third, as a comparative legal review, by examining foreign laws on drunk driving accidents, matters to be referred to in Korean laws and regulations are reviewed. Fourth, I would like to make a legislative proposal by reviewing the problems and improvement plans of the drunk driving legal system. Previous studies on drunk driving have mainly focused on strengthening the punishment for drunk driving. This study intends to review the general crime prevention aspect by not only strengthening punishment but also changing the public's perception through education.

Results: Drunk driving affects not only drunk drivers, but also others and society. It is necessary to keep in mind that drunk driving is a potential homicide, and the prohibition of drunk driving should be strengthened. In addition, if the general prevention effect can be successfully established and nudged against the offenses of

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drunk drivers, social costs can be reduced.

   Conclusion: *For drunk driving, both the 'external motivation' such as punishment, as well as the 'intrinsic motivation' to act in compliance with the norm must be activated. To this end, it is necessary to raise awareness that drunk driving must be caught and punished. The certainty of punishment has a positive effect on crime deterrence. Also, in the case of self-driving cars in the era of the 4th industrial revolution, there are no regulations for drunk drivers, so a review should be carried out.*

1. Introduction

   The seriousness of drunk driving became a big social issue in the wake of the death of the late Chang-ho Yoon by a drunk driving vehicle on September 25, 2018. With this incident as an op-portunity, the Blue House National Petition appealed for severe punishment for the perpetrators of drunk driving, saying, "Drunk driving is not a mistake, it is murder, and drunk driving should not be lightly punished so that no more injustice occurs." Since then, the Act on the Aggravated Punishment of Specific Crimes has been in effect since December 18, 2018, and the Road Traffic Act, which strengthens the enforcement standards for drunk driving, has been in force since June 25, 2019. The revised Road Traffic Act, which will come into effect on June 25, 2019, strengthens the minimum blood alcohol level that is judged to be intoxicated from 0.05% or higher to 0.03% or higher, and the standard for revocation of a drunk driving license will also be raised to 0.08% or higher. It was strengthened and it was stipulated that the license would be revoked from the second drunk driving case, but this part was determined to be unconstitutional. The disqualification period for re-acquisition of a license has also been newly added to grant a disqualification period of 5 years if a fatal accident is caused by drunk driving. Penalties for events based on drinking levels were also strengthened. In recent years, the Special Criminal Law has been applied preferentially over the Criminal Law, which is widespread enough to neu-tralize the normative power of the criminal law[1].

   The purpose of punishment for a crime can be said to be retribution and prevention of indi-vidual criminals. Retribution is to punish the offender by making the person responsible for the crime as much as he or she has committed the crime. Prevention includes general prevention for the general public and special prevention aimed at improving criminals and preventing re-cidivism. Retribution and prevention may be emphasized differently depending on the nature of the crime or the circumstances of the times. Sentencing for drunk driving basically emphasizes the function of prevention. This is because, in general crimes, most of the victims exist, but in the case of drunk driving, if there is no traffic accident, there are usually no victims. The police function to crack down on drunk driving is essential for a safe society and the existence of a nation[2]. In addition, it is necessary to prevent crime by conducting urban regeneration and CPTED activities in community activities, including crime prevention activities related to drunk driving[3].

2. Current status of Drunk Driving

   Regarding driving, the Supreme Court said, "If we take a look at the legislative purpose and purpose of the Road Traffic Act, the driver's license system, and the system and contents of the penalties for unlicensed driving, the Road Traffic Act provides. In principle, only those who have obtained a driver's license in accordance with the procedures stipulated by the Traffic Act are permitted to legally drive a motor vehicle, etc.[4].

   In general, victims of drunk driving have accidents in an unpredictable state and cause tre-mendous damage not only to individuals, but also to their families and society. In particular, it adversely affects the livelihood of families as they cannot work economically. The types of drunk

driving can be broadly classified into knowledge aspect, sensitivity aspect, behavioral aspect, and habitual aspect. Many drunk drivers are optimistic that there will be no arrests and no accidents. Even though it is reasonable to leave the car for a drink or spend the cost of driving a car, it is a pervasive risky choice. First, in terms of knowledge, it is a case in which a drunk driver drives after calculating his or her condition numerically. Overconfidence in their alcohol consumption and driving skills. Alcohol decomposition rate is a case of overconfidence in one's own condition uniformly despite differences occurring due to various factors such as gender, weight, type of alcohol, constitution, and snacks. Second, in terms of sensitivity, it is a case in which the drunk driver thinks that he can control himself and falls into delusion and rationalization due to lack of risk sensitivity. Third, in terms of behavior, it is driving to avoid enforcement. This is based on an availability bias, where someone tells you that you have been drinking and driving and you are not caught, and that it is because you have previously been driving under the influence of alcohol. Fourth, in terms of habit, it is a case of habitual drunk driving despite being punished for drunk driving. Therefore, education on the dangers of drunk driving should be strengthened[5][6].

Table 1. Drunk driving statistics.

Year (Korea)	2017		2018		2019		2020	
	Drunken drive number of occurrences	Number of traffic accidents	Drunken drive number of occurrences	Number of traffic accidents	Drunken drive number of occurrences	Number of traffic accidents	Drunken drive number of occurrences	Number of traffic accidents
Number of cases	19,517	216,335	19,381	217,148	15,708	229,600	17,247	209,654

Note : Korean National Police Agency.

3. Responses to Drunk Driving in Each Country

3.1. United States of America

In the United States, traffic crimes such as drunk driving, driving without a license, and reckless driving are regulated by traffic laws. However, the federal courts have jurisdiction over traffic offenses in territories owned or controlled by the federal government under applicable federal law. Most states treat up to two drunk driving offenses as an offense if there are no fatal accidents, and instead of criminal punishment such as detention or license suspension, demerit points and fines are imposed through civil and administrative sanctions[7]. However, if the drunk driving causes serious damage such as property damage or personnel accident, it is treated as a felony. For example, New York State classifies drunk driving into DWAI(Driving while ability impaired by alcohol) and DWI(Driving while intoxicated)[8]. WAI is when intoxicated but has a blood alcohol concentration of 0.08% or less(§ 1192(1)) and DWI is higher. Most states in the United States have enacted implied consent, which means that all drivers who drive on public roads are deemed to have consented to a chemical test to measure breath. In case of suspicion of drunk driving, the US police largely measure it through field sobriety tests or chemical tests. Chemical tests include breath tests, blood tests and urine tests[9] If a driver refuses to take a breathalyzer test, he/she will be subject to criminal punishment or suspension or revocation of his/her driver's license. If you are caught driving under the influence of alcohol, there are many restrictions on overseas travel. Even in EU countries including the United States, Japan, Taiwan, Sweden, Australia, the United Kingdom, Canada, and New Zealand, if there is a history of drunk driving and a criminal record on the immigration form or electronic travel permit, visa-

free entry is highly likely to be denied. must be issued separately. For example, New York State classifies drunk driving into DWAI(Driving while ability impaired by alcohol) and DWI(Driving while intoxicated)[10]. In addition, if you are caught driving under the influence of alcohol, it will be difficult to use car rental services abroad. In the case of the United States, it varies from state to state, but in some states, if a person is injured by drunk driving, it is not a crime of drunk driving, but second degree murder, and in this case, it is not subject to the special pardon of the president. In Michigan, if your blood alcohol level is above 0.1%, you will be charged with attempted murder. In Washington state, if a drunk driver kills someone, it is a first-degree murder and can be sentenced to life in prison. In addition, according to US federal law, if your license is revoked for drunk driving, you will not be able to re-acquire your license for at least 2 to 5 years. In the United States, secondary preventive education and secondary preventive rehabilitation programs are implemented. Implement group and person-centered intervention programs. The same program as in the UK is conducted[11][12].

3.2. Japan

The purpose of the Road Traffic Act in Japan is to prevent dangers on the road, to promote the safety and smoothness of other traffic, and to contribute to the prevention of obstacles caused by road traffic. However, drunk driving is strictly regulated by the Road Traffic Act because there is a high risk of impeding not only the driver's own safety, but also the safety of the body and life of other traffic participants and smooth traffic[13]. In Japan, according to the Automobile Driver Accidents Punishment Act, if a motor vehicle is driven under the influence of alcohol or drugs in a state where it is difficult to have a normal right-of-way, the person who injures a person shall be sentenced to up to 15 years in prison, and the person who kills another person shall be punished by imprisonment for not more than one year. In cases where there is a violation of the duty of relief under the Road Traffic Act, the person who injures them shall be sentenced to up to 22 years and 6 months in prison, and in the case of death, up to 30 years in prison. In Japan, the blood alcohol concentration control standard was strengthened from 0.05% to 0.03% in 2002, and there is a penalty clause that holds the driver responsible for driving under the influence. If a person who has been driving under the influence of alcohol is caught driving under the influence of alcohol, the passenger, the driver, and the vehicle provider and the alcoholic beverage provider are also punished. Alcoholic beverage providers may require drivers to sign an oath upon entering the restaurant or refuse to sell alcohol if there is a possibility of attempting to drive under the influence. In addition, the penalty points for drunk driving are higher than when a fatal accident is caused by a traffic accident. In Japan, the number of drunken accidents has decreased because of the frequent enforcement of hidden patrol vehicles, which are indistinguishable from ordinary civilian vehicles.

3.3. Germany

In Germany, the maximum penalty for drunk driving is 5 years. In addition, the maximum disqualification period for a drunk driving license is 5 years, and in some cases, it can be permanently revoked. In Germany, a penalty is imposed for two years after obtaining a driver's license or for exceeding 0.0% blood alcohol level if under the age of 21. In other words, the danger of drunk driving is imprinted at the stage of obtaining a license. Germany is implemented in three forms, taking into account the age of the drunk driver, the severity of the drinking, and the number of crimes. Divided into improvement programs for drivers who have been convicted of serious drunk driving. AFN(Gesellschaft fur Ausbildung, Fortbildung und Nachschulung), an accredited organization, supports individual education for drunk drivers.

4. Improvement Plans for Drunk Driving Regulations

It is necessary to examine the criminology theory to prevent drunk driving. Reinforcing punishment for drunk driving is a policy based on the deterrence theory. Classical criminologists Beccaria and Bentham advocated the theory of deterrence. Beccaria argued that punishment is not a means of retribution, but a means of preventing crime in society, and that it should be limited to the minimum necessary for the purpose of preventing crime. Also, it was considered that the degree of punishment is sufficient to cause the offender to slightly exceed the loss he or she loses through the punishment than the profit gained by the crime. By emphasizing general prevention, he argued that not only the amount of punishment, but also the degree of speed, certainty, and severity of the execution method of the punishment can prevent crimes. Increasing the severity of punishment can reduce crime to some extent. However, it is more effective to increase the certainty of detecting and punishing crimes rather than increasing the intensity of punishment.

Beccaria also asserted that "the most effective way to prevent crime lies in certainty, not cruelty, of punishment[14]".

There are also many empirical studies that show ambiguity[15][16].

Also, there are scholars who argue for the introduction of negligent drunk driving in case there is a case where the burden of proof is difficult even though drunk driving is an intentional offence[17]. And efficient monitoring and monitoring of drunk driving is inevitably required[18].

Table 2. Standard of punishment.

Alcohol concentration results	0.03% to less than 0.08%	0.08% or more
Punishment	Criminal punishment, suspension of license for 100 days	Criminal penalties, license revocation
	Criminal penalties for non-compliance with measurement, license revocation	

Note : In case of criminal punishment: imprisonment for not more than 5 years or a fine not exceeding 20 million won.

4.1. Introduction of the ignition lock

The introduction of an ignition lock is proposed as a countermeasure to prevent drunk driving in advance. Those who have been punished for driving under the influence of alcohol more than twice are obliged to drive only cars equipped with a drunk driving prevention device[19]. In other words, after the driver supplies power to the ignition key and turns on the ignition switch, when the ignition lock completes warming up, it measures the exhaled air for a few seconds and prevents the engine from starting if the alcohol level is 0.03 or higher. In particular, policy measures that can effectively prevent habitual drunk driving include supplementing administrative measures that can directly block drunk driving in addition to criminal punishment, and an electronic technology device that blocks drunk driving as a means of suppressing drunk driving. The public should be aware of the dangers of drunk driving through the introduction, reinforcement of customized education and training to correct drunk driving habits of habitual drunk drivers, and active policy promotion and educational activities[20].

4.2. Improvement of insurance system

In the case of drunk driving traffic accident perpetrators, under the current automobile insurance terms and conditions, drunk driving perpetrators are charged 3 million won for personal accidents and 1 million won for property accidents as self-pay.

Even if a drunk driving accident occurs, if the perpetrator pays only a certain amount, the insurance company pays the rest, and there is no additional responsibility, so he can lament "moral hazard."

Therefore, it is necessary to raise the co-payment for drunk driving perpetrators by three times or more than the current one.

4.3. Reinforcement of education when acquiring a driver's license

It is necessary to strengthen education on prevention of drunk driving in the requirements for obtaining a driver's license.

When acquiring a driver's license, it is necessary to reinforce the perception that drinking and driving is not a single drink while driving by instilling the awareness that drunk driving is a murder and imprinting the impact on the safety of citizens. There is no legal basis for the current voluntary crime prevention activities[21][22][23].

4.4. Revision of the road traffic act when introducing autonomous vehicles

Article 44 of the Current Road Traffic Act(prohibition of driving while intoxicated) states, "① Anyone who is intoxicated with automobiles, etc. Hereinafter, the same shall apply in this Article, Article 45, Article 47, Article 93(1) 1 through 4, and Article 148-2), streetcars or bicycles shall not be driven. ② When a police officer deems it necessary for traffic safety and danger prevention, or if there are reasonable grounds to admit that he or she has driven a motor vehicle, streetcar, or bicycle while intoxicated in violation of paragraph(1), the driver is intoxicated It can be measured by breathing survey. In this case, the driver shall comply with the police officer's measurement. ③ For a driver who is dissatisfied with the measurement result under paragraph(2), the driver may obtain the consent of the driver and take another measurement, such as blood collection. ④ The standard for being intoxicated, which is prohibited from driving pursuant to Paragraph 1, shall be when the driver's blood alcohol concentration is 0.03 percent or higher." In other words, the Road Traffic Act prohibits driving when there is a risk of normal driving due to the influence of drunk driving, overwork, disease, drugs, etc.

Therefore, self-driving cars, which do not perform the entire process of driving directly, can be driven even in the case of drunkenness, so the regulation of regulations is required[24]. Self-driving cars are a useful tool in the era of the 4th industrial revolution that can change the quality of human life, but there is a risk at every moment.

In addition, legal issues regarding the attribution of liability in the event of an autonomous vehicle accident arise, so consideration is required. the participation of the most representative residents in the local community is expanded through the local community open call system for organizing and operating the advisory group, where various residents can directly experience police activities and, through this, it will be necessary to establish an institutional mechanism to actively raise their opinions[25].

4.5. Reinforcement of punishment for non-compliance with breathalyzer

The offense of not complying with a breathalyzer was not regulated when the Road Traffic Act was enacted in 1961, but was newly established with the amendment of the Road Traffic Act in 1980. In the background, the number of automobiles increased in the 1980s, and drunk driving emerged as a social problem, and when there were frequent cases of drivers refusing to take a breathalyzer when cracking down on drunk driving, it was legislated as a countermeasure. In Article 148-2(Penalty Provisions) of the current Road Traffic Act, Article 148-2(Penal Provisions), "a person who has reasonable grounds to admit that he or she is intoxicated and who does not comply with the measurement of a police officer under Article 44(2) (such as a motor vehicle or a road surface) (limited to those who drive a streetcar) shall be punished by imprisonment for not less than 1 year and not more than 5 years, or by a fine of not less than 5 million won and not more than 20 million won." However, in some cases, it is criticized that the punishment for not complying with a breathalyzer test is weaker than that for drunk driving. Therefore, it is appropriate to increase the level of punishment for non-compliance with breathalyzer tests by considering it as an act of drunk driving[26].

4.6. Strengthening education of drunk drivers

Currently, education for drunk drivers in Korea is subject to the order of attendance even for adult offenders who have been sentenced to probation under the Criminal Act from January 1, 1997 as the Criminal Act was amended in December 1995 and the Act on Probation, etc. was amended in December 1996. It is being implemented on the basis. The order to take courses is successful by requiring that criminals, such as drugs, drunk driving, domestic violence, and sexual violence, receive education and treatment for a certain period of time, who are highly likely to repeat the same type of crime due to mental or psychological causes or wrong problem recognition and behavioral habits. It is a system to actively prevent recidivism by improving. In Korea, education is conducted in the form of 8 hours a day for 5 consecutive days, and long continuous classes are considered to be a factor that halves the effectiveness of education as concentration decreases. In addition, it is a process in which individual services and counseling are impossible while providing large-group education rather than small-group education. The lack of professionalism due to frequent replacement of program facilitators is also pointed out as a problem. Therefore, in the case of drunk drivers, in order to prevent recidivism, it is necessary to efficiently allocate the time to complete education on social adaptability and mental health issues, and to implement customized programs according to the motives for drunk driving[27]. In particular, active follow-up management is required to prevent recidivism by conducting intensive or short-term counseling along with participation in education. Continuous and active follow-up management should be established by establishing a cooperative system with local community organizations for those who are ordered to take drunk driving lessons.

4.7. Improvement of blood alcohol level measurement

According to Korea's Road Traffic Act, the offense of drunk driving is per se law, in which if the blood alcohol concentration is above a certain level, it is immediately established without examining whether the driving ability has deteriorated[28]. For the blood alcohol concentration, respiration measurement, blood pressure measurement, and estimation by Widmark's formula are used. Article 44(2) of the Road Traffic Act states, "There is no substantial reason to admit that a police officer was driving a motor vehicle, streetcar, or bicycle while intoxicated in violation of paragraph(1) or deemed necessary for the safety of traffic and prevention of danger. If there is, it can be measured whether the driver is intoxicated by breathing survey[29][30]. In this case, the driver must comply with the measurement by a police officer." Therefore, when cracking down on drunk driving, blood alcohol concentration is primarily measured by respiration.

However, the measurement of blood alcohol concentration by respiration measurement actually estimates the alcohol concentration in the blood using only the alcohol concentration in exhaled air, not the blood alcohol concentration prescribed by the Road Traffic Act as the standard for drunk driving. It cannot be regarded as direct evidence for that. Article 44(3) of the Road Traffic Act stipulates that "A driver who is dissatisfied with the measurement result under paragraph 2 may obtain the driver's consent and take another measurement by means of blood sampling, etc." Drivers who are dissatisfied are allowed to re-test through a blood test. When a driver requests blood collection from the beginning or requests blood collection at the measurement site because he or she is dissatisfied with the results of the respiratory measurement, blood is collected at a medical institution, such as a nearby hospital or clinic, and then the blood is requested for analysis to the National Forensic Service. In this case, if a significant elapse from the intermittent time to the blood sampling time has elapsed, the blood alcohol concentration is calculated according to the Widmark calculation method. In order for drunk driving to be established, it is necessary to prove that the blood alcohol concentration at the time of driving was 0.03% or higher. can occur.

At this time, the police usually use the so-called 'widmark formula' to estimate the blood alcohol concentration at the time of driving based on the amount of alcohol consumed, the time

of drinking, weight, etc. or post-mortem measurements. In general, the Supreme Court will say that, in the case of using empirical rules such as scientific formulas to determine the existence or non-existence of criminal constituent facts, strict proof is required for individual and specific facts that are the premises for the application of the rules, and in the case of Widmark formula, the application Since the amount of alcohol consumed, time of drinking, weight, etc. are required as data for this, strict proof is needed to admit such a premise(Supreme Court decision 99 degrees 128 on June 27, 2000; Supreme Court decision on October 12, 2007) 1292 judgment in 2007. The Supreme Court said that there are various factors that can affect blood alcohol concentration in addition to the basic data required for the application of the above formula, so this should also be clearly identified by evidence. The Supreme Court also acknowledges that changes in blood alcohol concentration are affected by various factors. However, the Supreme Court excludes judgment on these influencing factors in the trial process, even though it is necessary to clarify various factors through evidence. Therefore, empirical research that can increase the reliability and validity of Widmark is required.

4.8. Police officer drunk driving

Regarding the reasons and standards for disciplinary action for general public officials, according to the 'Enforcement Rules of the Public Official Discipline Ordinance', even if a traffic accident with human or material damage occurs, the 'salary reduction~ Honesty is the standard. However, for police officers, if they drive under the influence of 'police officer disciplinary action', regardless of the degree of drinking, as long as they cause a traffic accident that results in personal or material damage, 'demotion to dismissal' is possible. Police officers are stricter than general public officials. Since police officers have the authority to crack down on drunk driving, this purpose may have been reflected, but it needs to be reexamined in terms of equal rights.

5. Conclusion

Drunk driving is not just a traffic crime, it is a potential murder. Although the Constitutional Court's decision was partially unconstitutional, previous legislation has focused on significantly increasing the penalty for drunk driving and broadening the range of offenses punishable for drunk driving[31]. Of course, intensifying punishment can be effective in terms of general prevention of crime. However, it is necessary to improve public awareness and conduct regular traffic accident prevention education to solve more fundamental problems and to have high efficiency and normative power. The 2016 "Audi Reverse Driving Case" and the 2018 "Yoon Chang-ho Incident" greatly spread public opinion on the crime of drunk driving and increased the scope of punishment, while also raising the statutory punishment for each section. Under the current Road Traffic Act, if the blood alcohol concentration is above a certain level, the crime is immediately established without reviewing whether the driving ability is reduced or not. 'Per se law' has a greater purpose in promoting overall safety of road traffic rather than individualizing punishment. The precedent also held that the legislative purpose of the offense of drunk driving under the Road Traffic Act was to "ensure safe and smooth traffic by preventing and removing traffic hazards and obstacles caused by driving while intoxicated on the road". In order to eradicate drunk driving as described above, it is necessary to strengthen the punishment for drunk drivers and take proactive and ex post preventive measures such as orders to take safe driving courses. In other words, 'extrinsic motivation' such as punishment and 'intrinsic motivation' of complying with norms should be paralleled.

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7. Appendix

7.1. Authors contribution

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

7.2. Funding agency

Regulations

The Mediating Effect of Reliability and the Regulated Mediating Effect of Human Service in the Relationship of the Intention of Customer Behavior Under the REGULATIONS of Medical Skincare's Servicescapes

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Abstract

Purpose: The purpose of this study is to present the basic data for scalability for the provisions of the physical service environment for medical skincare by studying what influence the human service causes in between the servicescapes and reliability while analyzing the mediating effect of reliability between the servicescapes of medical skincare and the intention of customer behavior.

Method: In this study, the statistical analysis was performed by using the SPSS 25.0 and PROCESS macro for SPSS program as an empirical analysis method for 511 copies for 17 cities and provinces nationwide based on an online survey method targeting men and women in their 20s through 50s, and in order to validate the regulatory effect of human service in the relationship between servicescapes and intention of the customer behavior, multi mediated effect analysis and the PROCESS macro model 7 were used to validate the significance of the mediating effect based the Sobel-test.

Results: In terms of the results of this study, first, regarding the existence of the mediating effect of reliability in terms of the relationship between the servicescapes and the intention of customer behavior, stability(β=.294, p<.001), surrounding environment(β=.183, p<. 001) and functionality(β=.179, p<.001) have caused a positive effect, while the reliability has caused a significant effect on the intention of customer behavior. Second, when the effect of servicescapes on the customer behavior via reliability would be enhanced by the human service, servicescapes and human service have caused a significant positive effect on the reliability, while the interactive effect of the servicescapes X human service was not significant.

Conclusion: The results of this study demonstrate that the physical improvement of servicescapes in terms of the medical skincare is a major factor for increasing the customer satisfaction and the intention to revisit, and since the customers' reliability perceived by the customers towards the hospital and the staffs' human service can also increase the intention to revisit, it is considered that stability, environment, and functionality in terms of servicescapes should not be neglected for the customer attraction and profitability related performance.

[Keywords] Medical Skincare, Servicescapes, Human Service, Reliability, Intention of Customer Behavior

1. Introduction

Unlike the past, in the modern society, since the level of income has risen, the desire for beauty and health has incrementally enlarged[1]. Furthermore, in the recent years, since appearance has been regarded as one of the individuals' competitivenesses[2], the demand for the skincare and cosmetics to improve the appearance[3] has increased over time[4]. Within the skincare industry, since the demand related to the skin medical treatment and cosmetic surgery has increased as a method based on the appearance orientedness in the 21st century, it began to expand in the form of medical skincare[5]. According to the medical statistics in the metropolitan area of the National Statistical Office in 2013,

plastic surgery increased by 20.1% and dermatology by 18.6% over the past 5 years in terms of the rates of increase and decrease of clinics by each field of treatment[6]. As such, since the demand for the medical skincare has increased, the number of hospitals has also grown, and a higher level of satisfaction has been required[7].

Furthermore, attention has been paid to the space of skincare as servicescapes, which is a comprehensive environment of service which can respond to the diverse and individual customer needs, and it has been presented as a key management strategy[8]. As such, it may be said that the importance of servicescapes, which has a large influence on the customers' preferences and purchases[9] and where the service communication takes place, has been stressed[10]. In general, the servicescapes has been proven to be a factor influencing the improvement of service quality or customer satisfaction[11]. In addition, the customer would select a hospital based on the several complex factors including servicescapes, and continues to revisit only when trust and satisfaction with the human service are achieved[12]. As such, the customers' satisfaction might change depending on such specific factors as service quality, physical environment, and service pricing, which could influence the customer behaviors such as repurchase and reuse[13].

Examining the previous studies of this study, the relationship between servicescapes perceived by the sports center users and customer satisfaction, customer trust and the intention to re-register[14], effect of servicescapes of aesthetic shops and service providers' aesthetic labor on the intention of customer behavior and the mediating effect of hyperactivity and emotional response[15] have been studied, and while studies have been performed on the effect of servicescapes such as sports centers and aesthetic shops on the customer behavior, the studies on medical skincare are inadequate, and in terms of the customer purchasing behaviors caused by servicescapes, there is still an even greater inadequacy of studies on whether the trust in hospitals and, furthermore, human service influences the customer purchasing behavior are influenced.

Accordingly, in this study, first, the effect of servicescapes of medical skincare on the intention of customer behavior is analyzed, while second, the mediating effect of reliability between the servicescapes of medical skincare and the intention of customer behavior has been studied. Third, what effect the human service causes between the servicescapes and reliability has been analyzed with the purpose of presenting the basic data for the scalability of the physical service environment of the medical skincare by analyzing how it influences the human service.

2. Theoretical Background

2.1. Servicescapes

Servicescapes, which is a representative concept expressing the service environment, is a physical and social environment which has artificially been created to ensure that the service providers can control the consumers[16]. It was claimed that the servicescapes, which is recognized to be excellent in the existing studies on servicescapes, has a positive effect not only on the customers but also on the employees[17]. Since the servicescapes is a key factor which can amplify or suppress the customers' emotions, it could set the mood for positive or negative emotions[18]. As for the sub-factors of servicescapes, surrounding environment, functionality, aesthetics, stability, and convenience were used. The surrounding environment refers to the background characteristics of the environment such as room temperature, lighting, fragrance, and color[13]. Functionality refers to the role and effect of a function[19], while aesthetics refers to the overall beauty or charm perceived via the design of an object[20]. Stability refers to the property of maintaining a constant state without changing[21], and the last convenience refers to the convenience and ease of use[22].

2.2. Reliability

The dictionary definition of reliability is the property of being able to trust and rely upon[23]. Reliability emerges if and when the customers believe that a company has the capability and motivation to

deliver the quality products and services which they want, and such reliability influences the customers' behavior[24].

2.3. Human service

In the service industry, the human service's quality is the most basic and essential factor for inducing the customer satisfaction and the customer trust, and is also recognized as the most important within the service industry[25]. The attitude, tone of voice, and behavior of the employees towards the consumers are very important in the service management, and there are the studies which recommend that their emotions amy be transferred to the consumers[26]. Such human service's quality is achieved in the moment service is rendered, and various customer contact services of the customers and employees are combined to create the image of a service company[27].

2.4. Intention of customer behavior

The intention of customer behavior is a concept which includes the behaviors such as satisfaction, favorable word of mouth, revisit, intention to recommend, and loyalty which the customers become aware of after experiencing the relevant product or service[28]. Furthermore, as a result of the satisfaction process after using the company's product or service, it may be said to be an individual's subjective belief or will which seeks to plan and change the future behavior based on the customer's emotional response to the product or service and the experience and internal reaction perceived after making the purchase[29].

3. Research Method
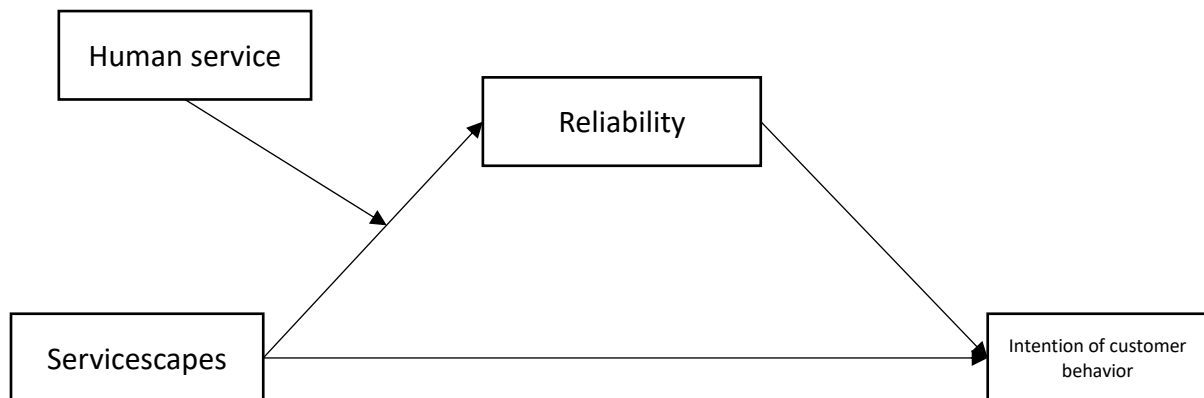
3.1. Research subject

For this study, in order to examine the mediating effect of reliability and the mediating effect of human service in the relationship between medical skincare servicescapes and intention of customer behavior, from October 3, 2021 until November 14, 2021, a total of 530 online questionnaires and consent forms were distributed and collected for men and women in their 20s and 50s across 17 cities and provinces nationwide, and 511 copies were selected and analyzed, excluding 19 copies with insincere responses.

3.2. Survey method

In this study, the online questionnaire method was used as the survey tool to empirically analyze the research questions, and the general characteristics of the questionnaire were consisted of 7 questions[30] using a nominal scale, and 9 questions on the status of use of the medical skincare[30][31], 21 questions for servicescapes[13], 5 questions for reliability[12], 12 questions for human service[32], and 3 questions for the intention of customer behavior[33], for a total of 57 questions using a Likert 5-point scale, and the researcher has corrected and supplemented them appropriately for this study.

3.3. Research model

Figure 1. Research model.

3.4. Research questions

H1, the mediating effect of reliability in the relationship between the servicescapes and the intention of customer behavior will be significant.

H2, the influence of the servicescapes on the customer behavior via reliability will be strengthened by the human service.

3.5. Method of statistical analysis

The following statistical analysis was performed for the data of this study by using the SPSS 25.0 and PROCESS macro for SPSS programs.

First, to verify the validity and reliability of the measures used for the study, the exploratory factor analysis and the internal agreement(Cronbach's α) for each measure were calculated.

Second, the frequency analysis was performed to examine and understand the general characteristics of the research subjects, and the descriptive statistical analysis was performed to identify the characteristics of the research variables.

Third, the Pearson's correlation was performed to examine and understand the correlation between the research variables.

Fourth, in order to validate the regulatory effect of the human service in terms of the relationship between the servicescapes and the intention of customer behavior, an analysis utilizing the multiple mediation effect analysis and the PROCESS macro model 7 was performed, and the significance of the mediating effect was verified via the Sobel-test.

4. Research Results

4.1. Reliability and validity test

The exploratory factor analysis was performed to test the validity of the variables used for this study. The principal component analysis and the varimax rotation were used as the methods. As for the factor classification, if the factor loading exceeded .40, it was classified as a relevant factor. As for the servicescapes, as a result of the factor analysis performed with 13 questions excluding the 8 questions which impeded validity, the KMO measure turned out to be .896, and the Bartlett's sphericity test turned out to be significant(x^2 =2456.488, p<.001), and it was confirmed that it was an appropriate form to proceed with the facto analysis, and the servicescapes were classified into 4 factors, and the 4 factors demonstrated 65.680% of the factor explanatory power.

The first factor was named 'surrounding environment' with 4 questions, second factor was named 'functionality' with 2 questions, third factor was named 'aesthetic impression' with 4 questions, and the fourth factor was named 'stability' with 3 questions, respectively. As a result of factor analysis, the

KMO measure turned out to be .841 as a result of the factor analysis performed with 5 questions without any questions excluded, and as a result of the Bartlett's sphericity test, it turned out to be significant(x^2 =753.293, p<.001), and the factor analysis model was determined to be appropriate. As for the human service, as a result of the factor analysis performed with 8 questions excluding the 4 questions which impeded validity, the KMO measure turned out to be .892, and the Bartlett's sphericity test results turned out to be significant(x^2 =1434.471, p<.001), and hence, it was confirmed that it is an appropriate form to proceed with the factor analysis. Lastly, as for the intention of customer behavior, it was derived with 3 questions without any questions excluded, and as a result of the factor analysis performed, the KMO measure turned out to be .690, and the Bartlett's sphericity test results also turned out to be significant(x^2 =449.136, p<.001), and hence, the factor analysis model was determined to be appropriate, and as a result of the reliability analysis performed by using the Cronbach's alpha coefficient, the reliability coefficient of all variables turned out to be 0.6 or greater, thereby verifying the goodness of reliability.

4.2. Correlation analysis

The Pearson's correlation analysis was performed to examine and understand the correlation between the variables for this study, and the results are as illustrated in <Table 1>. As a result of the analysis performed, the surrounding environment had a positively significant relationship for the functionality, aesthetic impression, stability, servicescapes, reliability, human service, and the intention of customer behavior, and the functionality had a positively significant relationship for the aesthetic impression, stability, servicescapes, reliability, human service, and the intention of customer behavior, aesthetic impression had a positively significant relationship for the stability, servicescapes, reliability, human service, and the intention of customer behavior, and the stability has a positively significant relationship for the servicescapes, reliability, human service, and the intention of customer behavior. Servicescapes had a positively significant relationship for the reliability, human service, and the intention of customer behavior, and the reliability had a positively significant relationship for the human service and the intention of customer behavior, and the human service turned out to have a positively significant relationship for the intention of customer behavior.

Table 1. Correlation analysis.

	1	2	3	4	5	6	7	8
1.Surrounding environment	1							
2.Functionality	.574***	1						
3.Aesthetic impression	.461***	.431***	1					
4.Stability	.558***	.566***	.508***	1				
5.Servicescapes	.816***	.744***	.807***	.806***	1			
6.Reliability	.513***	.535***	.433***	.619***	.644***	1		
7.Human service	.504***	.548***	.399***	.632***	.633***	.822***	1	
8.Intention of customer behavior	.445***	.446***	.300***	.492***	.511***	.752***	.754***	1

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

4.3. Mediating effect of reliability on the relationship between the servicescapes and the intention of customer behavior

In order to verify the mediating effect of reliability on the relationship between the surrounding environment, functionality, aesthetic impression, stability, and the intention of customer behavior, which are the sub-factors of servicescapes, the multi-mediating effect analysis and the Sobel-test were performed, whose results are as illustrated in <Table 2> and <Table 3>. The first phase model verifies the effect of the independent variable on the parameters, second phase verifies the influence of the independent variables on the dependent variables, and the third phase verifies the influence of the independent variables and the parameter on the dependent variables. Across all 3 models, it was verified that the F value was statistically significant($p<.001$), and hence, the model was appropriate, and the explanatory power of the model was 45.0%, 29.8%, and 57.0%, each respectively.

Examining the results of the analysis performed, it turned out that, first, all of the servicescapes' sub-factors had a statistically significant effect on the reliability, and in terms of the order of influence, stability($\beta=.382$, $p<.001$), functionality($\beta=.198$, $p<.001$), surrounding environment($\beta=.147$, $p<.01$), and aesthetic impression($\beta=.085$, $p<.05$) had the largest influence. As for the second model, which verifies the influence of the independent variables on the intention of customer behavior, it turned out that stability($\beta=.294$, $p<.001$), surrounding environment($\beta=.183$, $p<.001$), and functionality($\beta=.179$), ($p<.001$) had a positive influence in their respective order. Lastly, as for the third model, which verifies the relationship between the parameters and the dependent variables, reliability had a statistically significant effect on the intention of customer behavior($\beta=.706$, $p<.001$). Furthermore, it was verified that functionality and stability did not become significant when input together with the parameters, which verified the fact that it was a fully mediated effect.

To verify the significance of the mediating effect, the Sobel test was performed, and the results are as illustrated in <Figure 2>. The mediating effects of all pathways were statistically significant. Gathering which, the surrounding environment, functionality, aesthetic impression, and the stability may be interpreted to increase the customers' reliability and increase the intention of customer behavior.
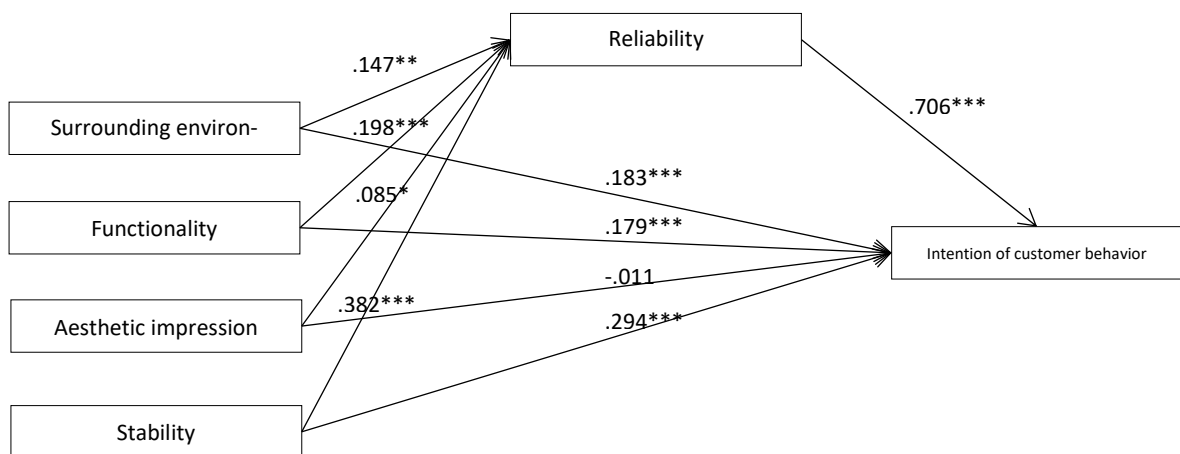
Table 2. Mediating effect of the reliability on the relationship between the servicescapes and the intention of customer behavior.

Model	DV	IV	B	SE	β	t	p	F(R²)
1	Reliability	Surrounding environment	0.153	0.045	0.147	3.385**	0.001	105.443*** (.450)
		Functionality	0.177	0.039	0.198	4.566***	0.000	
		Aesthetic impression	0.075	0.035	0.085	2.154*	0.032	
		Stability	0.363	0.042	0.382	8.618***	0.000	
2	Intention of customer behavior	Surrounding environment	0.222	0.060	0.183	3.728***	0.000	55.00*** (,298)
		Functionality	0.187	0.051	0.179	3.654***	0.000	
		Aesthetic impression	-0.011	0.046	-0.011	-0.239	0.811	
		Stability	0.327	0.056	0.294	5.876***	0.000	
3	Intention of customer behavior	Surrounding environment	0.096	0.047	0.079	2.042*	0.042	136.423*** (.570)
		Functionality	0.041	0.041	0.039	1.007	0.315	
		Aesthetic impression	-0.073	0.036	-0.071	-2.016	0.044	
		Stability	0.028	0.047	0.025	0.593	0.553	
		reliability	0.825	0.046	0.706	17.955***	0.000	

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

Table 3. Soble test.

IV	Z	p
Surrounding environment-> reliability-> intention of customer behavior	3.325965	0.000
Functionality-> reliability-> intention of customer behavior	4.425214	0.000
Aesthetic impression-> reliability-> intention of customer behavior	2.13898	0.000
Stability-> reliability-> intention of customer behavior	11.94532	0.000

Figure 2. Mediating effect of the reliability on the relationship between the servicescapes and the intention of customer behavior.

4.4. Regulatory effect of human service

In order to verify the regulatory effect of the human service on the relationship between servicescapes and reliability in terms of the structural relationship of the servicescapes, reliability, and the intention of customer behavior, the PROCESS macro model 7 was analyzed, whose results are as illustrated in <Table 4>. As a result of the analysis performed, servicescapes(B=.241, p<.001) and human service(B=.765, p<.001) had a significant positive effect on the reliability, and the interactive effect of servicescapes X human service was not significant. That is, while the regulatory effect was not significant, it was verified that the human service itself is a variable which increases the customers' reliability together with the servicescapes.

Table 4. Regulatory effect of human service.

Model	DV	IV	B	SE	t	p	F(R²)
1	Reliability	Servicescapes	0.241	0.037	6.490***	0.000	396.612*** (.701)
		Human service	0.765	0.035	21.841***	0.000	

		Servicescapes X Human service	0.023	0.046	0.492	0.623	
2	Intention of customer behavior	Servicescapes	0.064	0.053	1.208	0.228	332.588[***] (0.567)
		Reliability	0.844	0.045	18.937[***]	0.000	

*** p<.001

5. Conclusion

This study was performed for the purposes of validating as to whether reliability and human service influence the sevicescapes and the intention of customer behavior for the scalability of the medical skincare's physical service environment regulations. To achieve the purpose of the study, the online self entry type questionnaire was conducted for the survey with 511 men and women in their 20s and 50s nationwide, whose analytical results are as follows.

First, as for Hypothesis 1 which stated that there exists a mediating effect of reliability in the relationship between the servicescapes and the intention of customer behavior, stability(β=.294, p<.001), surrounding environment(β=.183, p<.001), and functionality(β=.179, p<.001) turned out to have a positive effect in their respective order, and in the relationship between the parameters and the dependent variables, reliability had a positively significant effect on the intention of customer behavior. This resembles the research results of Dooyeol Maeng, Youngmi Shim[34], Soonhee Kim[14], and Chaemok Yoo[12], and such results demonstrate that the hospital's appropriate room temperature, comfortable indoor air, functional beds, ararngement of wagon, etc., and the stable management of dangerous equipments, etc., largely influence the trust of the staffs and services on the hospital which the customers feel.

Second, as for Hypothesis 2 which stated that the effect of servicescapes on the customer behavior via reliability as a medium will be strengthened by the human service, servicescapes and human service had a positively significant effect on the reliability, and the interactive effect of servicescapes X human service was not significant. didn't That is, while the regulatory effect was not significant, it was verified that the human service itself is a variable which increases the customer reliability together with the servicescapes. This demonstrates that the positive professionalism, reliability, and interaction of the medical skincare related staffs have a positive effect on the reliability of the hospital which the customers feel. Such results demonstrate a trend similar to that of Namheung Cho[35].

Hence, it turned out that the more positive the perception of the medical skincare's servicescapes, and the greater the reliability on the hospital, the greater the intention of customer behavior, and the better the human service of the staffs, the greater the servicescapes and reliability of the medical skincare.

Such results demonstrate that in terms of the medical skincare, the customers value servicescapes to be important, and the improvement of servicescapes is a key factor for increasing the customer satisfaction and the intention to revisit. Furthermore, the reliability of the hospital felt by the customers and the human service of the staffs are also crucial variables which can help increase the intention to revisit, and hence, it is considered that it must not be neglected for the customer attraction and profitability related performance. To this end, it would be necessary to develop stability, surrounding environment, and functionality among the physical service environments of the medical skincare, and

furthermore, in terms of the basic data of marketing differentiation for the external and internal environments in the medical skincare market, and in terms of the academic aspect, the scalability of the regulations for the sub-factors of servicescapes is presented.

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7. Appendix

7.1. Authors Contribution

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

Regulations

The Natural Healing EXPERIENCE and Acceptance Attitude of the Senior Citizens Participating in Health Qigong Utilizing Grounded Theory

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Abstract

Purpose: This study was conducted as a qualitative research method in order to examine the natural healing experiences and acceptance attitudes of the senior citizens participating in Health Qigong. Towards this end, the analysis was performed by applying the grounded theory approach.

Method: As for the selection of research participants, the sample was extracted by adopting the purposeful sampling method, which is among the non-probabilities of the study. and finally, 15 people were selected as the research participants after confirming as to whether they were appropriate for the purposes of the study through a meeting of experts. In the data collection process, the participants were first selected through the first interview, theoretical samples were extracted, then the second interview was conducted. The raw data collected through the in-depth interview were described in words and transcribed, after which, the transcribed data and the interview details were checked for consistency.

Results: As a result of the analysis performed, a total of 18 categories, 34 subcategories, and 18 concepts were derived. In terms of the type classification, the participant type A turned out to be a 'social communication type' while the participant type B turned out to be a 'instrumental leisure activity type.' The participant type C turned out to be an 'active healing coping type,' while the participant type D turned out to be a 'selective giving up type.'

Conclusion: In this study, the details of the natural healing experiences and acceptance attitude of the senior citizens participating in Health Qigong were verified in depth. Such research results are meaningful in that they provided basic data to ensure that the Health Qigong program can play a mediating role in maintaining and restoring the mental and physical health of the senior citizens in a scientific manner.

[Keywords] Health Qigong, Grounded Theory, Senior Citizens, Experience, Acceptance Attitude

1. Introduction

Given the development of medical technology and living environment of the modern society, the average life expectancy has consistently increased, and longevity is no longer a dream for many beyond age 100. Contrary to which, the aging of society entails various tasks to be addressed such as economic problems, social isolation and alienation, and health problems for the senior citizens, which have also emerged as an important task to create a welfare society that improves the quality of life while maintaining a healthy, intellectual and emotional state[1][2][3].

Korea has been reported to be a country where the population aged 65 or older is entering the aging process at the fastest rate compared to the population aged 15 to 65 in terms of the comparative statistics between 2015 and 2050 among the OECD countries. As such, Korea is aging at the fastest rate, yet the social attention is required for the senior citizens given the single person households and nuclear families such as low birth rates[4]. Many previous studies

have been conducted, which mentioned family members and social interest and support, and in the rapidly evolving times, the senior citizens are afraid to learn on their own, and in order to alleviate the practical difficulties in adapting to the modern life, discussions in terms of the welfare of senior citizens are actively conducted at the national level[5][6][7]. Among which, various educational programs are evident for improving the quality of life and educational changes including leisure education programs, adaptation to and satisfaction with life in the old age, and continuing education[8][9][10].

For mankind, aging is an essential process which is predestined from birth, which, when broadly classified as for the aging phenomenon, first is the apparent aging, second is the functional aging caused by the degeneration of skin and muscles or bones and joints, and third is the morphological aging caused by a decrease in cells and atrophy of organs, and fourth is the psychological aging[11]. For the senior citizens, aging is a problem which involves managing various diseases as well as daily health care, and hence, self management related efforts are more needed than any age. In particular, physical, psychological, and social problems of the senior citizens with musculoskeletal disorders may be discovered in many studies related to the senior citizens[12][13][14].

In the modern society, in order to address the problem of the senior citizens, the perception is changing such that improving the quality of life is the cornerstone of creating a welfare society, not just extending life, but also maintaining a healthy condition physically, mentally, socially, intellectually and emotionally[15]. The announcement of the target system of the 2014 performance management implementation plan by the Ministry of Health and Welfare of the Korean government already stressed on the need for an effective preventive management system to enhance the sustainability of the medical system as the population is aging along with the increase in chronic diseases. That is, it is possible to confirm the policy recommendation that a new model needs to be presented where prevention and counseling are added for the primary care, which has been consisted of the existing treatment oriented compensation system for each behavior. As a national policy for the successful aging, Korea has provided an environment where people can participate in leisure sports to ensure that they can maintain their health even before they become senior citizens themselves[16][17].

It is very well known that the moderate physical activities are physiologically, psychologically and socially effective for the senior citizens when the previous studies which claimed that physical education can lead to physical health, mental health, and social health of senior citizens are examined[18][19][20]. Furthermore, even when examining within the framework of the newly emerging concept of the successful aging, it has been presented that it is also crucial for the senior citizens to successfully adapt themselves and to society, including cultural values, not simply having their disease free conditions[21][22].

In this study, the intention is to identify and understand how Health Qigong, whose stability and effectiveness have been proven as a senior citizen movement, is operating by using a vivid language based on a grounded theory approach. The details of such study may verify as to how the role of health intervention is performed through the actual voices of the participants, which would also be a methodological exploration of whether Health Qigong can be accessed as a scientific natural healing program.

2. Research Methods

2.1. Selection of the research participants

As for the research method, the analysis was performed by applying the grounded theory approach of Strauss and Corbin(1998). The research participants were selected by adopting the purposeful sampling method, which is among the non-probabilities of the study, and 7 participants were recommended and joined in a series by the snowball sampling. Finally, 15 people

were selected as the research participants after confirming as to whether they were appropriate for the purposes of the study through a meeting of experts. The selection of research participants was discussed with the local welfare centers and daily sports clubs, and the purposes of this study were explained, and the senior citizens who actively participated in the existing Health Qigong program and who had favorable attitudes were selected. The general characteristics of the research participants are as illustrated in <Table 1> below.

Table 1. General characteristics of study participants.

Number	Gender	Age	Occupation	Participation period	Underlying disease
Participant 1	Male	78	Fixed-term work	3 years	Musculoskeletal disorders
Participant 2	Female	72	Artist	4 years 6 months	Cholangitis, musculoskeletal disorders
Participant 3	Female	66	Inoccupation	3 years 2 months	Hypertension, musculoskeletal disorders
Participant 4	Female	65	Self-employment	5 years 6 months	Hypertension, diabetes
Participant 5	Female	76	Inoccupation	4 years	Angina pectoris
Participant 6	Male	74	Inoccupation	3 years 2 months	Hypertension, hyperlipidemia
Participant 7	Female	72	Inoccupation	3 years 6 months	Hypertension, musculoskeletal disorders
Participant 8	Female	74	Inoccupation	3 years	Hypertension, musculoskeletal disorders
Participant 9	Male	75	Inoccupation	3 years 2 months	stroke, hypertension
Participant 10	Female	69	Self-employment	2 years 6 months	Musculoskeletal disorders
Participant 11	Male	76	Inoccupation	3 years 4 months	Chronic nephritis, hypertension
Participant 12	Female	66	Family business	2 years 6 months	Musculoskeletal disorders
Participant 13	Male	69	Self-employment	3 years 4 months	Musculoskeletal disorders
Participant 14	Female	68	Inoccupation	3 years 2 months	Hypertension musculoskeletal disorders
Participant 15	Female	71	Inoccupation	3 years 6 months	Hypertension, musculoskeletal disorders

2.2. Process of data collection

The data collection process in this study began with the review of references, and the holding of meetings with related parties and experts. First, the participants were selected through the first round of interview and theoretical samples were extracted, followed by the second interview. The raw data collected through the in-depth interview was described in words and transcribed, then the transcribed data and the interview details were verified for consistency[23]. The questionnaire was consisted of 3 areas as illustrated in <Table 2> in consideration of the order of the details of the interview related to the study. As for the analysis of the data, the details of the field records and transcripts were repeatedly analyzed, and the details of the additional interview were announced to ensure that the information may be secured from the next interview.

Table 2. Questionnaire for participant interview.

1. Questions about participant background
- Please tell us briefly about your age, occupation, and family members. - Do you currently have an underlying medical condition? - If you have a chronic disease, what kind of disease do you have? - If you have an underlying disease, what diagnosis did you receive at the hospital? - What are you doing for treatment?
2. Questions about chronic disease healing through participation in Health Qigong
- When did Health Qigong start? - Please tell us about your motivation for participating in Health Qigong. - Do you think Health Qigong is effective in curing underlying diseases? - If yes, what positive experiences have you had? - Have you had any negative experiences with the effectiveness of Health Qigong?
3. Questions about participation in Health Qigong after covid-19
- Are there any changes to Health Qigong participation compared to pre-covid-19? - Are there any changes to Health Qigong training methods after covid-19? - Do you have anything you would like to say more about participating in Health Qigong after covid-19?

2.3. Process of data analysis

The analysis of data based on the grounded theory approach was attempted according to the open coding, axial coding, and selective coding presented by Strauss and Corbin (1998). The concepts collected were divided into subcategories, categories, and paradigms, and in order to examine the effects of the natural healing interventions for chronic diseases through the participant's Health Qigong, the opposite situation or viewpoint was reversed back and forth or up and down to induce the meaningful properties of the data by using the so called "flip-flop technique." In the grounded theory methodology, it was said that the theoretical sensitivity of a researcher is a very important concept which has a great influence on the quality of research, and the ability to respond to nuances, clues, and meanings in data is important, and during the analysis, asking questions and doing comparison are the basic methods for the analysis. Furthermore, it was said that the sensitivity of grounded theory is influenced by the researcher's individual characteristics and insights, professional experiences, references, and analytical experiences, and hence, while agreeing with the existing theories, the analysis ought to be performed by constantly asking questions such as the important meaning of the data, what is in progress, and what are the same and different among the various fields and areas[24][25].

3. Research Results

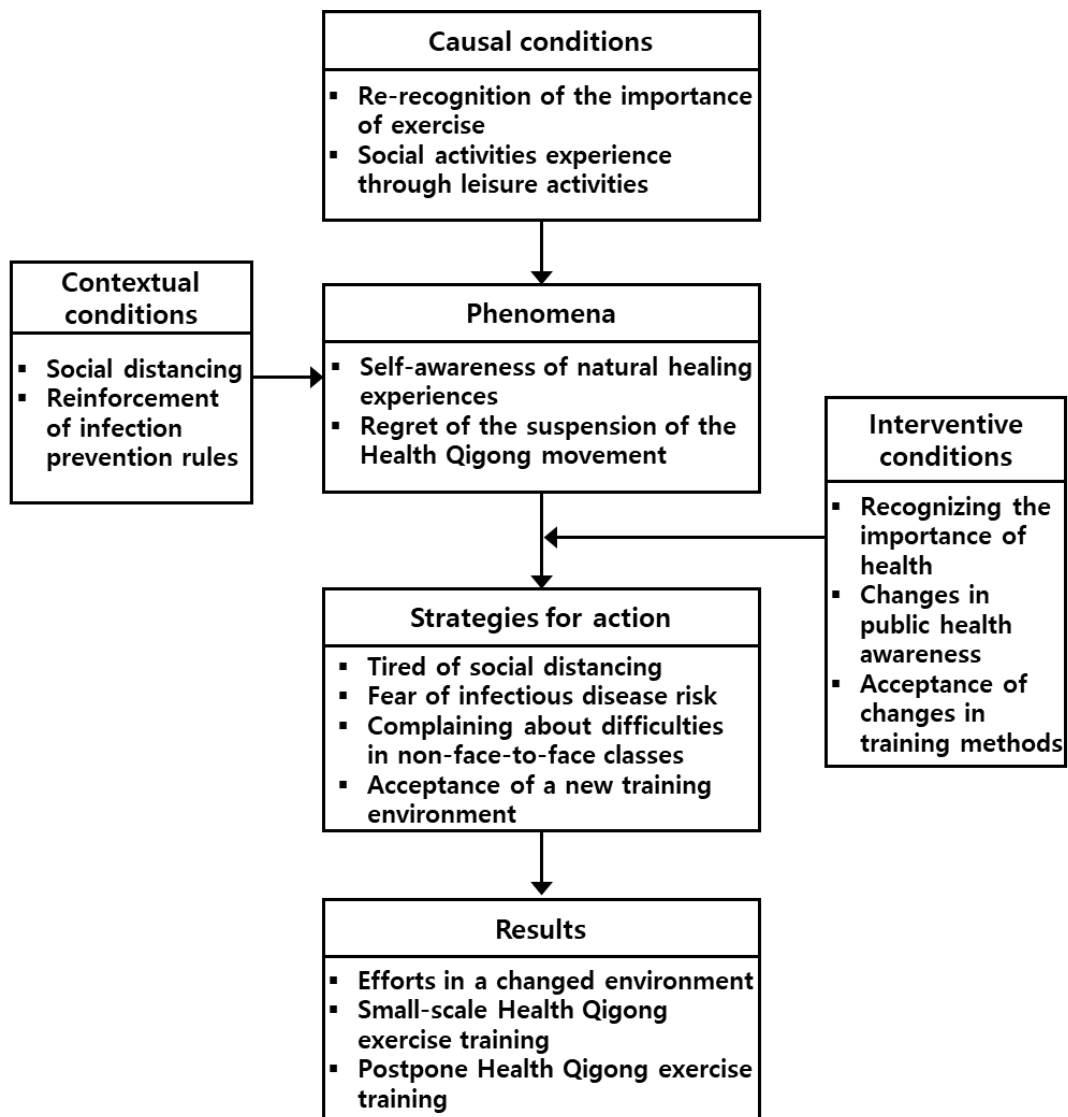### 3.1. Categorization of data via open coding

By carrying out the continuous questioning and comparative analysis through the participants of this study, 18 categories, 34 subcategories, and 18 concepts were derived from open coding. Examining the details, as for the causal conditions, there were the 3 types of re-awareness of the importance of exercise, recognition appropriate as a senior citizen movement, and social activity experience through leisure activities. As for the phenomenon, it turned out to be self-awareness of the experience of natural healing, various social experiences through training, and the disappointment of Health Qigong. As for the contextual conditions which have an impact on achieving the phenomenon, social distancing due to the COVID-19 and the strengthening of preventive measures for infectious diseases were evident. As for the action and interaction strategies of the participants, fatigue of the phased in distancing, fear of infectious disease related risk, complaint of difficulties in contactless class, and acceptance of new training

environment were evident. As for the intervening conditions, re-awareness of the importance of health, change in public health awareness to prevent infectious diseases, and acceptance of a change in training methods were evident. Finally, among the consequences, making an effort to the changed environment, conducting a small Health Qigong training, and delaying the Health Qigong training were verified.

3.2. Axial coding

Axial coding is a process of rearranging and combining data with a focus on the categories constructed via the open coding. By correlating the concepts and subcategories extracted from the open coding through the axial coding, paradigm models such as causal conditions, central phenomenon, contextual conditions, mediating conditions, action and interaction strategies, and results are presented and cross each other, demonstrating how they are connected. Therefore, in the axial coding, it is possible to verify the connection between the concept and the properties of subcategories by the paradigm model[26]. <Figure 1> presents a paradigm model for the participants' experience of the healing process and acceptance attitude.

Figure 1. Paradigm model of participants' healing process experience and acceptance attitude.
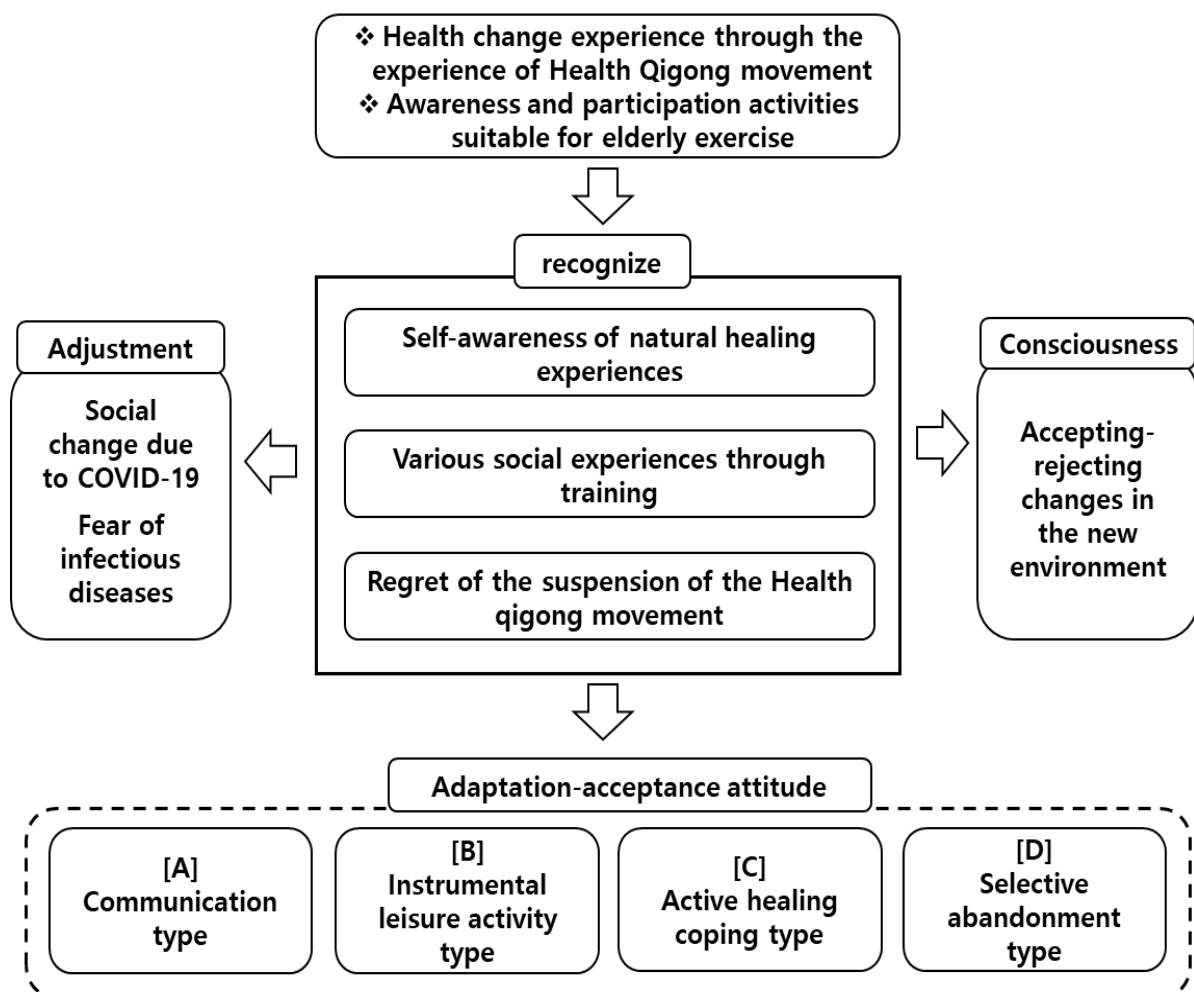
3.3. Selective coding

Selective coding is the final phase of the grounded theory, and it is the process of discovering core categories and integrating and refining other categories. In the phase of the selective coding, it is possible to construct a situational model which expresses the overall contents of the study with other categories and systematization, and a story line could be created based on the participants' processes and experiences. The core category of this study was the 'experience of natural healing through the participation in Health Qigong of the senior citizens and changes in the acceptance attitude according to the infectious diseases.' The participants were experiencing health changes through the Health Qigong related experiences, and they were actively participating in the program with the appropriate perception as the senior citizens movement.

However, given the expansion of the infectious disease called "COVID-19," the program acceptance attitude of the senior citizens participating in Health Qigong for health intervention has also begun to change. That is, while they were aware of the natural healing effect of Health Qigong, it is apparent that the participants are clearly demonstrating different attitudes in the case of infectious diseases. Such a change in the acceptance attitude is an aspect which can tell the participants' passive or active participation in Health Qigong, and is also an indicator which can confirm the attitude of the senior citizens participating in leisure activities in the aftermath of the COVID-19. The following <Figure 2> presents the situation model according to the core categories.

Figure 2. The structure of the situation model according to the core categories.

3.4. Type analysis of the participants' future strategies

In this study, the senior citizens participating in Health Qigong were classified into the 4 types according to their natural healing process and acceptance attitude for their experiences. The type analysis of the grounded theory seeks to classify the participants' experiences and acceptance attitude by verifying the hypothetical formalization of data and the iterative relationships between each category for theory building. Hence, among the participant types of this study, the first was named the 'social communication type,' which focuses on getting along with people around rather than being active on the effects of the natural healing of Health Qigong. Second, the type which likes oriental medicine exercise and thinks about the concept of leisure activities was named the 'instrumental leisure activity type.' The third was feeling on their own the natural healing effect of Health Qigong, which was named as the type of actively participating in the program even in the reality that his activities were restricted due to the COVID-19 - 'active healing coping type.' Fourth, the 'selective giving up type' refers to a type which is aware of the natural healing effect of Health Qigong, yet procrastinates the participation in the program due to the COVID-19 situation or participates according to the situation.

Table 3. Concept and categorization of open coding according to paradigm.

Paradigm	Category	Participant type			
		Communica-tion type	Instrumental leisure activity type	Active healing coping type	Selective abandonment type
Causal conditions	Re-recognition of the importance of exercise	Middle	High	High	Low
	Suitable for elderly exercise	Middle	High	High	Low
	Social activities experience through leisure activities	High	Middle	High	Low
Phenomena	Self-awareness of natural healing experiences	Middle	Middle	Strong	Strong
	Various social experiences	Strong	Strong	Strong	Weak
	Regret of the suspension of the health Qigong movement	Strong	Middle	Strong	Weak
Contextual conditions	Social distancing	Active	Active	Active	Active
	Reinforcement of infection prevention rules	Active	Active	Active	Active
Interventive conditions	Recognizing the importance of health	Middle	Middle	High	Middle
	Changes in public health awareness	High	High	High	High

	Acceptance of changes in training methods	Middle	Low	High	Low
Strategies for interaction/ action	Tired of social distancing	High	Middle	low	High
	Fear of infectious disease risk	High	Middle	High	High
	Complaining about difficulties in non-face-to-face classes	High	Middle	Low	High
	Acceptance of a new training environment	Middle	Low	High	Low
Results	Efforts in a changed environment	Active	Passive	Active	Passive
	Small-scale Health Qigong exercise training	Active	Passive	Active	Passive
	Postpone Health Qigong exercise training	Passive	Active	Passive	Active
Participant type		Participant 5, 8, 10	Participant 3, 7, 15	Participant 1, 2, 6, 9, 11, 13	Participant 4, 12, 14

<Table 3> above is one which has analyzed the types of acceptance attitude regarding the chronic disease healing process and experience of the senior citizens participating in Health Qigong. According to the causal condition of the paradigm, the central phenomenon, contextual condition, mediating condition, action and interaction strategy, and the consequence, the participants' high and low attitude related strength and awareness, and the passive or active situation related acceptance status may be identified and understood.

4. Conclusion and Recommendations

Given the development of medical technology and living environment of the modern society, the average life expectancy has consistently increased, and longevity is no longer a dream for many beyond age 100. Hence, in this study, the grounded theory methodology was used to verify the natural healing experience and acceptance attitude of the senior citizens participating in Health Qigong. Grounded theory, which is a form of the qualitative research method, is a research method which employs the inductive method to systematically collect and analyze the data for a certain phenomenon and prove the discovered theory to ensure that it can be tentatively proven. Hence, the grounded theory approach begins with the unstructured research question and provides research results based on a vivid language through a series of systematic processes which demonstrate the scene which is not appropriate for the quantitative research method[27][28].

Recently, various physiological and psychological studies are being conducted on the kinematic effects of Health Qigong, and in particular, research results are being published that it has a positive effect on the elderly health intervention[29][30][31]. Examining the results of the final research results by the participant type, the participant type A, who focuses on getting along with people around, turned out to be the 'social communication type.' The participant type B, who had good Health Qigong and thought about the concept of leisure activities, was

found to be an 'instrumental leisure activity type'. Participant type C, who has a good Health Qigong and thinks about the concept of leisure activities, turned out to be the 'instrumental leisure activity type.' The participant type C, who was feeling the natural healing effect of Health Qigong, and who sought to actively participate in the program even in the reality of being restricted in terms of activities due to the COVID-19, turned out to be the 'active healing coping type.' The participant type D is the 'selective giving up type' and refers to the type which is aware of the natural healing effect of Health Qigong, yet procrastinates the participation in the program due to the COVID-19 situation or participates according to the situation.

As in the above, in this study, the details of the natural healing experiences and acceptance attitude of the senior citizens participating in Health Qigong were verified causally and empirically. Furthermore, it was confirmed that, while falls and injuries present such a large risk for the senior citizens' exercise related continuation factors, the invisible threat of infectious diseases is operating as a significant factor in the COVID-19's pandemic situation. Such research results present the possibility that the Health Qigong program might play a mediating role in maintaining and restoring the mental and physical health of the senior citizens in a scientific manner.

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6. Appendix

6.1. Authors contribution

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

Regulations

The Mediating Effect of Self-Esteem on the Relationship Between Smartphone Dependency and Academic Helplessness of Adolescents According to the Smartphone Dependence REGULATION

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Abstract

Purpose: This study tried to verify the mediating effect of self-esteem in the effects of smartphone dependence among adolescents on academic helplessness.

Method: 2,404 first-year middle school students were selected as research subjects using data form the second year of the Korea Children and Youth Panel Survey 2018. For the analysis method, the mediating effect was analyzed using the PROCESS macro 3.5(Model 4) suggested by Hayes(2017).

Results: Results of the study First, there was a significant positive relationship and influence between smartphone dependence and academic helplessness of adolescents, Second, a significant negative relationship and influence between smartphone dependence and self-esteem, and Third, there was a significant negative relationship between academic helplessness and self-esteem. It has been found to influence negative relationships. Fourth, smartphone dependence indirectly affects academic helplessness through self-esteem and plays a partial mediating role.

Conclusion: These results are meaningful in that they revealed the indirect mediating effect of self-esteem in the path that smartphone dependence leads to academic helplessness. Therefore, through the results of this study, it was suggested that various programs are needed to reduce smartphone dependence and academic helplessness, and to recognize and improve the importance of self-esteem in the educational field for correct study and growth of adolescents.

[Keywords] Adolescents, Smartphone Dependency, Academic Helplessness, Self-Esteem, Mediating Effect

1. Introduction

1.1. The necessity of the research

For teenagers in modern society, smartphones are a means of communication and a necessity to obtain various information, express themselves, and communicate with other friends, and 95.9% of teenagers have smartphones[1]. As a result, adolescents' smartphone dependency was found to be very high at 35.8% compared to 22.2% of adults. In particular, as adolescents spend more time alone, anxiety, depression, and stress levels also increase, the time to use smartphones increases, which is used to relieve those negative psychological conditions[2].

Various discussions and efforts are being made to solve this excessive smartphone use problem. However, as non-face-to-face classes and culture spread due to COVID-19, smartphones have become an essential tool for adolescents to study and interact in their peer communities.

Therefore, it can be said that it is the time when the preventive intervention of adolescents' overuse of smartphones and the resulting problems is important.

Adolescents' excessive use and smartphone dependency can cause physical, emotional, and learning problems. In the physical part, eye fatigue, turtle neck syndrome, muscle pain, and carpal tunnel syndrome may occur[3]. In the emotional part, problems such as decreased concentration, anxiety, and distraction may occur. As learning problems, problems such as decreased concentration and learning time are emerging[4][5].

Prior studies related to adolescents' smartphone dependency and academic helplessness are still insufficient, and related prior studies have mainly focused on Internet addiction, mobile phone addiction, and game addiction affecting adolescents. Looking at similar studies, it was confirmed that when addicted to smartphones, class concentration decreases significantly and academic achievement weakens as well[6]. A study analyzing the correlation between cell phone dependence, parenting attitude, and school life adaptation of middle school students found that there was a negative correlation between cell phone dependence and school life adaptation[7]. It is predicted that there will be a positive correlation between smartphone addiction and academic helplessness.

On the other hand, personal protection factors related to smartphone dependence include self-esteem[8], self-control[9], and self-efficacy[10]. Among them, self-esteem refers to the degree to which one has a positive or negative attitude toward oneself and how valuable an individual feels about oneself. In particular, adolescents' self-esteem has greater influence than any other time period on individual behavior and their future[11]. Therefore, in relation to problem behavior such as smartphone dependency and the development process of psychological descriptions, it is an important variable that contributes to preventing, mitigating, and solving the problem behavior they face[12].

Looking at previous studies on smartphone dependence and self-esteem, Bianchi and Phillips[13] argue that people with low self-esteem avoid self-awareness and can fall into avoidance behavior such as mobile phone addiction rather than the active response in situations they don't like to face. In a study of adolescents and college students, low self-esteem was also found to be a significant influencing factor on smartphone dependence[14]. A study on the effect of smartphone addiction on depression suggested that self-esteem is a very important variable that can prevent depression caused by smartphone addiction[15]. In addition, it was found that problems related to smartphone use are emerging as problems not only for teenagers and adults but also for elementary school students and that excessive use of smartphones by elementary school students can affect their adaptation to school and their stress level[16].

This study deduces that self-esteem can have a mediating effect in the relationship between adolescents' smartphone dependence and their academic records as a personal protective factor. Accordingly, various programs are needed to reduce smartphone dependence and academic helplessness by verifying the mediating effect of self-esteem as a protective factor that can reduce adolescents' smartphone dependency, and recognize and improve the importance of self-esteem in the educational field[17][18].

Therefore, we intend to empirically analyze the increasingly serious smartphone dependency and their effects, and present policy directions for adolescents who rely on smartphones based on the results. In particular, this study empirically verifies the mediating effect of self-esteem in the relationship between adolescents' smartphone dependency and academic helplessness and proposes alternatives at the practical and policy level according to the results.

1.2. The purpose of the study

The purpose of this study is to examine the relationship and effect of adolescents' smartphone dependency, self-esteem, and academic ability, and to empirically verify the mediating effect of self-esteem in the relationship between smartphones and academic helplessness, and the specific goals are as follows.

1) It identifies the degree of adolescents' smartphone dependency, self-esteem, and academic helplessness.

2) Identify the correlation between adolescents' smartphone dependency, self-esteem, and academic helplessness.

3) It identifies the effect of adolescents' smartphone dependency and self-esteem on academic helplessness, and identifies the mediating effect of self-esteem in the relationship between smartphone dependence and academic helplessness.

2. Research Method

2.1. Research design

This research is a descriptive study to empirically verify the mediating effect of self-esteem in the relationship between adolescents' smartphone dependency and academic helplessness.

2.2. Research subjects and data collection

This study is based on data from the Korea Children/Youth Panel Survey(KCYPS) 2018 of the Korea Youth Policy Institute(2019). This data was disclosed(December 01, 2020) and received consent and approval(September 01, 2021). The population of KCYPS is students enrolled in the first grade of middle school as of 2018. The 2017 Basic Education Statistics of the Ministry of Education were used as a sampling framework and samples were taken through a multistage stratified cluster sampling method. As a result, the final 2,590 cohort panel members for first graders in middle school nationwide were gathered. This study was conducted on a total of 2,404 first-year middle school adolescents(1,303 males and 1,101 females), excluding 186 missing values for variables used in the analysis and 2,590 respondents who did not use smartphones.

2.3. Research tool

1) Smartphone dependency

"Smartphone addiction self-diagnosis scale" developed by Kim et al.[19] was used as the smartphone dependence scale in the study. It consists of a total of 15 statements, and representative questions include "I continue using my smartphone while thinking that I should stop using it," "I'm happier using my smartphone than being with my family members or friends," and "I've been unable to focus on what I'm doing(study) because I've been using my smartphone." The score of each question is from 1 point of "Not at all" to 4 points of "Very much so" on the Likert scale. For some questions such as "I am not anxious without a smartphone" and "I don't spend much time using a smartphone," the higher the total score combined by reverse coding, the higher the level of smartphone dependency. The reliability coefficient of this study was Cronbach's α= .86.

2) Self-esteem

As for the measure of self-esteem, a total of 10 questions revised and supplemented, based on Rosenberg's scale[20] by the Korea Youth Policy Institute, were used. Negative questions such as "Sometimes I think I'm not good for anything," "I don't feel like there's much to be proud of," "Sometimes I feel useless," "I wish I could be more respectful of myself," and "I tend to feel like a failure" were reverse-coded. The score of each question is from 1 point "Not at all" to 4 points "Very much" on the Likert scale, and the higher the total score, the higher the level of self-esteem. The reliability coefficient of this study was Cronbach's α = .84.

3) Academic helplessness

The academic helplessness scale is a scale developed by Park et al.[21], consisting of a total of 16 questions. Representative questions include "I don't think I can overcome the difference in academic skills on my own," "No matter how much I study, I don't think I can do better than now," and "I don't think I can solve academic problems on my own." The score of each question is from 1 point "Not at all" to 4 points "Very much so" on the Likert scale, and the higher the total score, the higher the level of academic helplessness. The reliability coefficient of this study was Cronbach's α = .92.

2.4. Data analysis

In this study, data were analyzed using SPSS 25.0 and PROCESS macro version 3.5. First, frequency analysis and descriptive statistics were conducted to examine the general characteristics of the study subjects. Second, descriptive statistical analysis and Pearson correlation analysis were performed on major variables to examine the correlation among major variables. Third, it was analyzed as Hayes[22]'s PROCESS macro(Model 4) to confirm the mediating effect of self-esteem in the relationship between adolescents' smartphone dependency and academic helplessness. Fourth, the significance of the indirect path was confirmed by the bootstrapping technique. By applying the 95% confidence interval, the sample was extracted 5,000 times and the analysis was performed to confirm it. If 0 is not included in the confidence interval, the indirect effect was interpreted as significant at the 95% confidence level.

3. Research Results

3.1. General characteristics of the subject

The general characteristics of the study subjects are as follows <Table 1>. The gender of the study subjects was 1,303 males(54.2%) and 1,101 females(45.8%), so there were more male than female. Looking at the size of the city(based on schools), 1,072 people(44.6%) in large cities, 987 people(41.1%) in small and medium-sized cities, and 345 people(14.4%) in towns and villages. Looking at the administrative district(based on residence), the "do" province(8 places) had the largest number of residents(55.4%). Next, 610 people(25.4%) in metropolitan cities(6), 398 people(16.6%) in Seoul, 39 people(1.6%) in Sejong Special Self-Governing City, and 26 people(1.1%) in Jeju Special Self-Governing Province were confirmed to reside in respective areas.

Table 1. General characteristics.

Variable	Categories	n	%
Gender	Male	1,303	54.2
	Female	1,101	45.8
City size (school standard)	Metropolis	1,072	44.6
	Small and medium city	987	41.1
	Rural area	345	14.4
Administrative division (residency standard)	Seoul special city	398	16.6
	Metropolitan city(6 number)	610	25.4
	Sejong-si	39	1.6
	Do(8 number)	1,331	55.4
	Jeju-do	26	1.1

Note: n=2,404.

3.2. Research subjects' smartphone dependency, self-esteem, and degree of academic helplessness

<Table 2> shows the results of analyzing the scores of smartphone dependence, self-esteem, and academic helplessness of the subjects of this study. The average score for self-esteem was the highest at 2.93(±0.45). The average score for smartphone dependence was 2.13(±0.46) out of 4 points. The average score for academic helplessness was 1.96(±.51). In addition, when looking at the skewness(-0.05~.10) and kurtosis(-.25~.02) of major variables, all the normality assumption criteria that the absolute value of skewness is 3 or less and the absolute value of kurtosis is 10 or less were satisfied[23].

Table 2. Technical statistics analysis of major variables.

Variable	M	SD	Skewness	Kurtosis
Smartphone dependency	2.13	.46	-.05	-.03
Self-esteem	2.93	.45	.10	.02
Academic helplessness	1.96	.51	.07	-.25

Note: n=2,404.

3.3. The correlation between study subjects' smartphone dependency, self-esteem, and academic helplessness

<Table 3> shows the results of analyzing the correlation between smartphone dependence, self-esteem, and academic helplessness of the subjects of this study. There was a negative correlation between smartphone dependence and self-esteem(r=-.408, p=.001). There was a positive correlation between smartphone dependency and academic helplessness(r=.421, p=.001). There was a negative correlation between self-esteem and academic helplessness(r=-.519, p=.001). The correlation between smartphone dependence, self-esteem, and academic helplessness was all found to be statistically significant. In addition, the correlation of the main variables showed a value between -.519 and .408, and no correlation was found at the suspected level of multicollinearity. In the regression model, the value of the VIF(variance inflation factor) between variables was 1.369 or less, which did not exceed 10, making it less likely to be a multicollinearity problem[24].

Therefore, it can be seen that the higher the adolescents' smartphone dependency, the lower their self-esteem. In addition, as smartphone dependency increases, academic helplessness increase. In turn, it was confirmed that self-esteem decreases when academic helplessness increase.

Table 3. Correlation analysis between major variables.

Variable	Smartphone dependency	Self-esteem	Academic helplessness
	r(*p*)	r(*p*)	r(*p*)
Smartphone dependency	1		
Self-esteem	-.408 (.000)	1	
Academic helplessness	.421 (.000)	-.519 (.000)	1

Note: n=2,404.

3.4. Effect of study subjects' smartphone dependency on academic helplessness and mediating effect of self-esteem

The effect of adolescents' smartphone dependency on academic helplessness was examined, and the mediating effect of self-esteem in the relationship between the two variables was verified. <Table 4> shows the analysis results using PROCESS macro(Model 4).

As a result of analyzing the effect of adolescents' smartphone dependency on academic helplessness, the F value was 516.546 which was statistically significant(p<.001), and the model was suitable. Adolescents' smartphone dependency explained their academic helplessness by 17.7%. Smartphone dependence had a significant positive effect on academic helplessness(β=.463, p=.001). It was confirmed that the higher the smartphone dependency, the higher the academic helplessness. In addition, as a result of analyzing the effect of adolescents' self-esteem on smartphone dependence, the F value was 479.991, which was statistically significant(p<.001), and the model was suitable. Adolescents' self-esteem explained 16.6% smartphone dependency. It was confirmed that self-esteem had a significant negative effect on smartphone dependence(β=-.393, p=.001), so that the higher the self-esteem of adolescents, the lower the smartphone dependency.

On the other hand, as a result of analyzing the effect of adolescents' smartphone dependency and self-esteem on academic helplessness, the F value was 570.275 which was statistically significant(p<.001), and the model was suitable. Adolescents' smartphone dependency and self-esteem explained 32.2% of academic helplessness. Smartphone dependence had a significant positive effect on academic helplessness(β=.276, p=.001), and self-esteem had a significant negative effect on academic helplessness(β=-.476, p=.001). These results confirm that the higher the adolescents' smartphone dependency, the higher the academic helplessness, and the higher the self-esteem, the lower the academic helplessness.

Table 4. The effects of smartphone dependency on academic helplessness and mediating effect of self-esteem.

Independent variable	Dependent variable	*Coeff (β)*	SE	t	p	95% CI	
						Lower	Upper
Smartphone dependency	Academic helplessness	.463	.020	22.72	.000	.423	.503
R^2=.177, F(1, 2402)=516.546(p<.001)							
Smartphone dependency	Self-esteem	-.393	.018	-21.90	.000	-.428	-.358
R^2=.166, F(1, 2402)=479.991(p<.001)							
Smartphone dependency	Academic helplessness	.276	.020	13.60	.000	.236	.315
Self-esteem		-.476	.021	-22.66	.000	-.518	-.435
R^2=.322, F(2, 2401)=570.275(p<.001)							

Note: n=2,404.

3.5. Verification of statistical significance of the mediating effect of the subject's self-esteem

Bootstrapping was set and analyzed 5,000 times to verify the statistical significance of the mediating effect of self-esteem in the relationship between adolescents' smartphone dependency and academic helplessness, and the results are shown in <Table 4>. As a result of the analysis, the path through which adolescents' smartphone dependency leads to academic helplessness through self-esteem is .162 to .214 in 95% confidence interval. The mediating pathway was found to be statistically significant because the confidence interval does not contain zero[21]. Therefore, it was confirmed that self-esteem plays a partial mediating role between adolescents' smartphone dependency and academic helplessness, and that smartphone dependency indirectly significantly affects academic helplessness by mediating self-esteem.

Table 5. Significance test of mediation effect of self-esteem.

Variable path	Indirect effect	Boot SE	95% CI	
			Boot lower	Boot upper
Smartphone dependency → self-esteem → academic helplessness	.187	.013	.162	.214

Note: n=2,404.

4. Discussion

The purpose of this study is to examine the relationship and influence between adolescents' smartphone dependency, self-esteem, and academic helplessness, and empirically verify the mediating effect of self-esteem in the relationship between smartphone dependence and academic helplessness. Focusing on the research results, we discuss as follows. First, the average score of adolescents' smartphone dependence, self-esteem, and academic helplessness was as follows: 2.93 points for self-esteem, 2.13 points for smartphone dependence, and 1.96 points for academic helplessness. In Kim and Park's study[25], smartphone dependence average was 2.19 points, which was similar to that of this study. Second, as a result of analyzing the correlation between smartphone dependence, self-esteem, and academic helplessness, there was a negative correlation between smartphone dependence and self-esteem. In addition, there was a positive correlation between smartphone dependency and academic helplessness. In addition, the relationship between academic helplessness and self-esteem showed a negative correlation. In other words, the higher the adolescents' smartphone dependency, the lower their self-esteem, and the higher their smartphone dependency, the higher their academic helplessness. In addition, it was confirmed that self-esteem decreased when academic helplessness increased. According to previous studies, there is a negative correlation between adolescents' smartphone addiction and self-esteem, a positive correlation between smartphone dependence and academic helplessness, and a negative correlation between academic helplessness and self-esteem. The results of this study were consistent with the results of these previous studies[26][27].

Third, in this study, the relationship between smartphone dependence and academic helplessness was examined in 2,404 middle school students. As a result, it showed 17.7% explanatory power. Self-esteem played a partial mediating role between adolescents' smartphone dependency and academic helplessness. It was confirmed that smartphone dependency had an indirectly significant effect on academic helplessness by mediating self-esteem. Comprehensively, these results show that various programs are needed to recognize and improve the importance of self-esteem in the educational field for reducing smartphone dependence and academic helplessness and correct academic activity and growth of adolescents.

5. Conclusion and Suggestion

Through the results of this study, the following suggestions are to be made.

First, excessive use of smartphones can lead to an increase in academic helplessness and negatively affect academic performance, so related policies and programs will be needed. According to Busch and Watson[28], concentration and performance decreased by 20% when smart devices were around while performing tasks that required a lot of brainwork. These results confirms that overuse of smartphones negatively affects academic performance[29]. Therefore, it is necessary to develop and apply programs such as learning concentration improvement programs, programs to overcome academic helplessness, and academic motivation improvement programs for students who need to identify and analyze their individual differences.

Second, the lower the self-esteem, the higher the smartphone dependency, and the higher the physical and emotional stress response. This can lead to maladaptive behaviors such as mental illness, alcoholism, depression, suicide, and drug abuse[30]. In addition, since academic performance may decrease due to increased stress and reduced self-esteem[31], positive psychological programs along with health education should be provided to maintain and improve health through positive self-esteem.

This study has verified the mediating effect of self-esteem in the relationship between adolescents' smartphone dependency and academic helplessness, and found that self-esteem as a protective factor is a predictor. However, since the population was only targeting 2,404 students in the first year of middle school, there is a limit to generalizing the results of this study to all middle school students. As a follow-up study, we would like to propose to investigate the relationship and impact of adolescents' smartphone dependency and academic helplessness due to COVID-19, and further identify the causes of lowered academic performance to provide basic data on government measures against it.

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7. Appendix

7.1. Authors contribution

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

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