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Corresponding author*
E-mail: kntwo@hanmail.net

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The Effect of the Diving Club Membership's Educational Satisfaction on the Brand Asset and the Intention to Revisit

Seongjin Hong[1]
Honam University, Gwangju , Republic of Korea
Seungjung Woo[2*]
Jangan University, Hwaseong, Republic of Korea

Abstract

Purpose: *The purpose of this study is to provide the basic data for the development of the diving industry by examining and understanding the educational satisfaction of students who are diving club members, and by examining the relevance to brand asset and the effect on intention to revisit.*

Method: *A survey was conducted with 355 students through the significance sampling method among the students who received diving education. The final measurement tool with validity and reliability secured consisted of 11 diving educational satisfaction questions, 5 brand asset questions, and 4 intention to revisit questions was used. For the data processing, frequency analysis, exploratory factor analysis, reliability analysis, correlation analysis, and multiple regression analysis were performed.*

Results: *As a result of this study, first, it turned out that lecture satisfaction and job related satisfaction, which are sub-factors of educational satisfaction, affect awareness, which is a sub-factor of brand asset. Second, colleague satisfaction, a sub-factor of educational satisfaction, turned out to affect loyalty, a sub-factor of brand asset. Third, the job related satisfaction and colleague satisfaction, which are sub-factors of educational satisfaction, turned out to have an effect on the intention to revisit.*

Conclusion: *Based on the results of the study, it was confirmed that the educational satisfaction of diving students affects the brand asset and the intention to revisit. The instructors engaged in diving and those involved in the diving industry ought to keep in mind that the educational satisfaction of students during the diving education contributes to the development of the diving organization and further the development of the diving industry over the long term.*

Keywords: ***Leisure Sports, Diving, Educational Satisfaction, Brand Asset, Intention to Revisit***

1. Introduction

Today, as the interest in leisure activities has increased, the number of consumers participating in leisure sports has also continuously increased, and diving is one of the representative sports of leisure sports. Diving refers to an action procedure in which humans are directly exposed to the pressure of the depth when they are active in the water[1].

Diving is classified into scuba diving and free diving[2]. Scuba diving refers to the equipment designed to freely explore underwater while wearing a compressed air container in which breathing gas is stored as 'Self Contained Breathing Apparatus'. In the case of free diving, it is the oldest diving method, and it is a diving form in which one breathes in and holds breath after exhaling several times on or above the surface without a special breathing equipment.

Currently, there are two main types of diving in Korea, and each diving organization conducts training for diving enthusiasts through its affiliated instructors. In Korea, diving education mainly depends on the instructor's ability, experience, and competency, and hence, there is no

standardized education. It may be said that it is difficult to understand how satisfied the students are with the diving instructor's education.

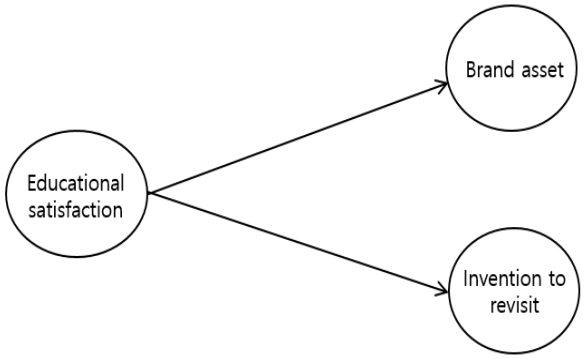
Satisfaction is the overall feeling that an individual feels after using a product or service. Satisfaction may also be said to be the difference between user expectations and values[3]. Educational satisfaction in diving may be said to be the difference between the student expectations and the evaluation of diving education services. etc[4]. High satisfaction in diving education can lead to the brand image of diving related industry or bring about a high loyalty toward revisiting educational place.

If the club members who feel satisfaction through diving education are favorable to brand asset and have the intention to reuse it, diving organizations and related industry workers can secure continuous profits as suppliers. In particular, if diving trainees, who are consumers, have the intention of reuse, they are highly likely to become regulars, and it may be of great help to the diving industry as it creates a long-term demand. Oliver proved the hypothesis that the customer satisfaction has a significant effect on the attitude of the consumer and that it continuously influences the repurchase of the product[5]. The need to proceed in this regard is raised in the study of trainees, who are diving consumers, to be revealed in this study. However, as demonstrated in the previous studies, the studies related to educational satisfaction brand asset, and intention to revisit of the scuba and free diving trainees are insufficient.

Examining the related previous studies, there are on education and the level of satisfaction[6][7][8]. Studies were conducted on leaders by [9][10] and [11], while those on business management were conducted by [12][13][14] and [15]. However, as shown in the previous studies, the studies on scuba and freediving trainees' educational satisfaction, brand asset, and intention to revisit are inadequate.

Hence, the purpose of this study is to provide the basic data for the development of the diving industry by understanding the educational satisfaction of students who are diving clubs, and by examining the relevance to brand asset and the effect on intention to revisit.

Figure 1. Research model.



2. Research Method

2.1. Research subjects

This study was conducted with 370 trainees who received diving training in Seoul and Gyeonggi region. The subject samples were extracted by using the purposive sampling method. The subjects agreed to the purpose and procedure of the study, and after collecting the questionnaire, 355 subjects were analyzed except for the questionnaire determined to be of the data which answered unclearly or some of the contents of the survey were omitted. The general characteristics of the study subjects are as illustrated in <Table 1>.

Table 1. Demographic characteristics.

Classification		Frequency	Percent
Gender	Men	205	57.7
	Women	150	42.3
Age	Teens	10	2.8
	20s	99	27.9
	30s	126	35.5
	40s	78	22.0
	50s or older	42	11.8
Type of diving	Skin scuba diving	208	58.6
	Free diving	147	41.4
Level of diving	Entry	148	41.7
	Mid	129	36.3
	Upper	54	15.2
	Instructor level of greater	24	6.8
	Total	355	100.0

2.2. Measurement tools and methods

2.2.1. Structure of the questionnaire

In this study, as a survey tool, a questionnare was consisted of 4 questions(gender, age, diving type, and grade) asking about the individuals' basic backgrounds, 26 questions on educational satisfaction(lecture satisfaction, job related satisfaction, and colleague satisfaction), 11 questions on brand asset(awareness and loyalty), and 4 questions on intention to revisit, for a total of 45 questions. The items in the questionnaire for measuring each variable were on a Likert 5-point scale. The detailed contents of the questionnaire are as illustrated in <Table 2>.

Table 2. Contents of the questionnaire.

Classification	Formative indicator	No. of questions
Personal characteristics	Gender, age, diving type, grade, diving experience	4
Educational satisfaction	Lecture satisfaction, job related satisfaction, colleague satisfaction	26
Brand asset	Awareness, loyalty	11
Intention to revisit		4
Total questions	45	

The structure of the questionnaire for the students who are diving club members is as follows. As for the educational satisfaction, referring to the research questionnaire of [16] and [17], the number of questions was reduced and the contents were revised and supplemented to fit the research target, for a total of 26 questions including lecture satisfaction, job related satisfaction and colleague satisfaction. The brand asset factor was consisted of 11 questions as brand awareness and loyalty factors by correcting and supplementing the questions used by [18] and [19]. The intention to revisit was consisted of 4 single factor items by modifying and supplementing the sentences used based on the studies of [20] and [21].

2.3. Validity and reliability

To verify the validity of this study, exploratory factor analysis was performed, and the varimax rotation method was used. In this process, unnecessary items or items with a low factor loading were removed. Only the items with factor loadings of .60 or higher for each factor were used.

The degree of internal consistency of each factor was evaluated by using the Cronbach's α coefficient. The questionnaire used for this study was 0.60 or greater, which is the standard suggested by [22], and hence, it may be said that internal consistency was secured. In light of the reliability of the scale, it is determined that there is no problem in the hypothesis testing.

2.3.1. Validity and reliability of the educational satisfaction

As a result of conducting the exploratory factor analysis to check the validity of educational satisfaction questionnaire, it turned out to be as in <Table 3>.

As for the educational satisfaction, 3 factors were extracted from 26 items to 11 items, excluding the items with low factor loadings. They explain 82.246% of the total factor variance. The inter-factor loadings between each item were .50 or greater.

Table 3. Validity and reliability analysis of the educational satisfaction.

Contents	Lecture satisfaction	Job satisfaction	Colleague satisfaction	Commonality factor
Understanding the purpose of education	**.886**	.233	-.086	.848
Positive effects of education	**.873**	.064	.231	.820
Full class preparation in place	**.867**	.051	.289	.838
Application of training program	**.836**	.094	.330	.817
Professional and systematic process	**.834**	.141	.317	.816
Consistent with educational goals	**.831**	.055	.265	.764
Job landing related confidence	.126	**.926**	.104	.884
Employment, job performance ability	.047	**.896**	.074	.811
Other qualifications acquisition related help	.143	**.866**	.165	.798
Sense of unity with colleagues, a sense of comradeship	.283	.100	**.887**	.877
Close with colleagues	.336	.256	**.772**	.775
Total	4.617	2.579	1.851	
% dispersed	41.977	23.446	16.823	
% accumulated	41.977	65.423	82.246	
Reliability	.946	.893	.790	
KMO = .797, Chi-Square = 3599.061, Sig .= .000				

The suitability test for the factor analysis is the KMO(Kaiser-Meyer-Olkin) standard fit, and the values between 0.5 and 1 are suitable for factor analysis. The KMO standard fit of the stu-

dents' educational satisfaction was .797, chi-square(χ^2) was 3599.061, and sig(p) was .000, indicating that the factor analysis was appropriate. As a result of the reliability analysis, lecture satisfaction(α=.946), job related satisfaction(α=.893), and colleague satisfaction(α=.790) turned out to be good.

2.3.2. Validity and reliability of the brand asset

The results of the validity analysis of the brand asset questionnaire turned out to be as in <Table 4>.

As for the items on brand asset, 2 factors were extracted from 5 items by excluding the items that showed a low difference in factor loading values from 11 items. They explain 83.943% of the total factor variance. The loading value for the factors between each item is .50 or greater.

Table 4. Validity and reliability analysis of the brand asset.

Contents	Awareness	Loyalty	Commonality factor
Whether it's an affiliated organization's mark	**.935**	.059	.878
Whether unique shape of the mark	**.928**	.171	.890
Whether distinct from other organizations	**.855**	.309	.827
Whether training organization is trusted	.034	**.923**	.852
Instructor's equipment preferred	.331	**.800**	.750
Total	2.578	1.619	
% dispersed	51.561	32.382	
% accumulated	51.561	83.943	
Reliability	.916	.719	
KMO = .728, Chi-Square = 1033.331, Sig. = .000			

The KMO standard fit of the brand asset factor is .728, chi-square(χ^2) is 1033.331, and sig(p) is .000, and hence, the factor analysis is appropriate. As a result of the reliability analysis, awareness(α=.916) and loyalty(α=.719) demonstrated good reliability.

2.3.3. Validity and reliability of the intention to revisit

The intention to revisit was set with 4 single factors(revisiting the pool, wanting to use it any time, visiting again after obtaining a qualification, and using the current pool during practice). As a result of the reliability analysis, the reliability of intention to revisit turned out to be α=.968.

2.3.4. Data processing method

For the data processing in this study, the SPSS Ver 20.0 statistical analysis program was used. The contents of the method to be analyzed are as follows.

First, the descriptive statistical analysis and the frequency analysis were performed according to the purpose of data analysis. Second, an exploratory factor analysis was performed for validity verification. For the reliability analysis, the Cronbach'α was performed. Third, correlation analysis was conducted to find out the degree of relevance between each sub-factor of the construct. Fourth, the multiple regression analysis was conducted to verify the causal relationship between diving students' educational satisfaction on brand asset and intention to revisit. The significance level of the statistics was α=.05.

3. Results and Discussion

3.1. Correlation analysis

Correlation analysis is used for the hypothesis testing and provides approximate relationships among factors by suggesting the strength of the relationship between major factors before performing the analysis. The correlation analytical results are as illustrated in <Table 5>.

Table 5. Correlation analysis by factor.

Classification	1	2	3	4	5	6
Lecture satisfaction	1	.264**	.572**	.357**	.179**	.211**
Job related satisfaction		1	.343**	.199**	.115*	.022
Colleague satisfaction			1	.212**	.310**	.342
Awareness				1	.384**	.393**
Loyalty					1	.867**
Intention to revisit						1

Note: *p<.05, **p<.01.
1. Lecture satisfaction, 2. job satisfaction, 3. colleague satisfaction, 4. awareness, 5. loyalty, 6. intention to revisit.

As a result of analyzing the relationship between each factor in this study, it turned out that there was a positive correlation in lecture satisfaction, job related satisfaction, colleague satisfaction, awareness, loyalty, and intention to revisit.

3.2. Effect of educational satisfaction on the brand asset

As a result of the multiple regression analysis performed on the effect of diving students' educational satisfaction on brand asset awareness, they are illustrated as in <Table 6>.

Lecture satisfaction and job related satisfaction, which are sub-factors of educational satisfaction, turned out to be statistically significant in the awareness of brand asset, and the overall explanatory power was analyzed as 14%(R^2=.140). Lecture satisfaction and job related satisfaction, which are sub-factors of educational satisfaction, turned out to affect awareness, which is a sub-factor of brand asset.

Table 6. Effect of educational satisfaction on brand awareness.

Classification	B	SE	β	t	p
(Constant)	1.656	.322		5.150	.000
Lecture satisfaction	.456	.081	.339	5.596	.000
Job related satisfaction	.116	.052	.117	2.220	.027
Colleague satisfaction	-.029	.080	-.022	-.358	.720

Note: F=19.018***, R^2=.140.
*p<.05, ***p<.001.

In the case of Korean students, diving education is conducted with an emphasis on the “sports focused class” designated by the Ministry of Education. While there are differences in the educational system for each diving organization, the contents are similar when executed. However, there is a difference in the satisfaction of education in terms of the experiences or abilities of diving instructors. The experience level of diving includes various risk factors in the actual activity process, and the role and competency of the leader act as a very important factor in the entire process. While the level of education for each diving organization is different, if the students are satisfied, the brand awareness of each organization will increase demonstrated in the results of the study.

Said that educational satisfaction is further enhanced by systematically providing students with an experience of physical activity in the water, where diversity and hierarchy are secured[23]. It may be said to explain the importance of students' educational satisfaction, and it may be said that this study supports the results.

As a result of the regression analysis performed on the effect of the diving students' educational satisfaction on brand asset loyalty, they are illustrated as in <Table 7>.

Table 7. Effect of educational satisfaction on brand loyalty.

Classification	B	SE	β	t	p
(Constant)	2.758	.280		9.857	.000
Lecture satisfaction	.001	.071	.001	.019	.985
Job related satisfaction	.009	.046	.010	.192	.848
Colleague satisfaction	.335	.070	.305	4.787	.000

Note: $F=12.420^{***}$, $R^2=.096$.

$^{***}p<.001$.

Colleague satisfaction, a sub-factor of educational satisfaction, turned out to be a statistically significant result for brand asset loyalty, and the overall explanatory power was analyzed as 9.6%(R^2=.096).

Claimed that when members have a high level of trust in the practice venue, cohesion will be further strengthened compared to other competitive practice venues[24], and interdependence will increase, thereby preventing members from leaving. These results may be said to be similar to those of this study.

Diving education does not simply sell goods, but provides an opportunity to experience various marine activities, and friendship and exchange among the club members is of utmost importance. If loyalty, a brand asset, may be increased through educational satisfaction, each diving educational organization and diving industry can secure the long-term customers. Claimed that the advertising effect on the word of mouth of existing customers is quite large, contributing to an increase in profits from a long-term perspective of the company[25][26][27]. It is determined that the synergies will be even greater if diving students become active members of the club after the training is completed.

3.3. Effect of educational satisfaction on the intention to revisit

As a result of the regression analysis performed on the effect of the diving students' educational satisfaction on intention to revisit factor, they are illustrated as in <Table 8>.

Table 8. The effect of educational satisfaction on the intention to revisit.

Classification	B	SE	β	t	p
(Constant)	2.721	.295		9.235	.000
Lecture satisfaction	.041	.075	.034	.554	.580
Job related satisfaction	-.100	.048	-.110	-2.073	.039
Colleague satisfaction	.424	.074	.361	5.761	.000

Note: $F=17.212^{***}$, $R^2=.128$.

$^{*}p<.05$, $^{***}p<.001$.

The job related satisfaction and colleague satisfaction, which are sub-factors of educational satisfaction, demonstrated statistically significant results in the intention to revisit, and the overall explanatory power was analyzed as 12.8%(R^2=.128).

Claimed that the customer satisfaction with the marketing mix at sports centers had a significant positive effect on the customer trust and their repurchase related intention in a study on customer trust and repurchase intention, and may also be said to be supportive[28]. Confirmed that increasing the customer trust should be prioritized in order to increase the customers' re-

use related intention[29]. Claimed that the relationship recovery strategies and structural strategies had a significant effect on the repurchase intention of female fitness customers[30]. It may be confirmed that this is partially consistent with the results of the study.

In fact, in the case of diving instructors, there are many cases where they start as a hobby in the beginner's course, gain various experiences, and then change their profession to a full-time instructor. As an instructor, there are not many cases when training, selling equipment, or changing one's organization. Furthermore, there are many cases where students go back to diving training places and conduct training. The instructors engaged in diving and those involved in the diving industry should keep in mind that the educational satisfaction of students during diving education contributes to the development of the diving organization and further the development of the diving industry in the long term.

4. Conclusion and Recommendations

The purpose of this study is to analyze how the educational satisfaction of diving students affects the brand asset and the intention to revisit. A survey was conducted on 355 students based on the significance sampling method among the students who received diving training. The measuring tools were consisted of 11 questions of diving educational satisfaction, 5 questions of brand asset, and 4 questions of the intention to revisit. For the data processing, frequency analysis, exploratory factor analysis, reliability analysis, correlation analysis, and multiple regression analysis were performed. The research results carried out according to the research procedure are as follows.

First, it turned out that the lecture satisfaction and the job related satisfaction, which are sub-factors of educational satisfaction, affect awareness, which is a sub-factor of brand asset. Second, colleague satisfaction, a sub-factor of educational satisfaction, turned out to affect loyalty, a sub-factor of brand asset. Third, job related satisfaction and colleague satisfaction, which are sub-factors of educational satisfaction, turned out to have an effect on intention to revisit.

This study was conducted on scuba diving and free diving, but it is necessary to conduct future research because of the characteristics of each sport. It is expected that the diving industry will develop further if further research is conducted to determine the level of diving education and instructors in each region.

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6. Appendix

6.1. Author's contribution

	Initial name	Contribution
Lead Author	SH	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Corresponding Author*	SW	-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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Corresponding author*
E-mail: wk11106@kmu.ac.kr

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Analysis of Adult Disease-Related Indicators by Age of Males 19 Years and Over in Korea

Wookwang Cheon

Keimyung University, Daegu, Republic of Korea

Abstract

Purpose: *The purpose of this study is to live a healthy life and prevent geriatric diseases in Korean adult males. Data from the National Health and Nutrition Examination Survey conducted by the Korea Centers for Disease Control and Prevention were used. The purpose of this study is to analyze the differences in adult disease-related indicators according to age of Korean adult males over 19 years of age.*

Method: *In this study, the raw data of the 7th 1st year of the 2016~2018 Korea National Health and Nutrition Examination Survey(KNHANES 2016~2018) was downloaded and reprocessed for use according to the purpose of study. A total of 8,106 males aged 19 years or older who participated in the 2016-2019 National Health and Nutrition Survey were selected and classified by age group as the study subjects. For statistical processing, the mean and standard deviation of all items were calculated using SPSS 27.0 Package. One-way ANOVA was performed to compare the differences in adult disease-related indicators by age group. The post-hoc test for the main effect was performed using the Tukey method. Statistical significance level was based on p<.05.*

Results: *As a result of analyzing adult-specific indicators for Korean adult males, significant differences were found in TC, HDL-C, TG, and LDL-C in blood lipid-related variables according to age. There were significant differences in both systolic and diastolic blood pressure in hypertension-related variables according to age. For diabetes-related variables, there were significant(p<.001) differences in fasting blood glucose, glycated hemoglobin, and glucose intake. In terms of muscle strength, there was a significant difference in both grip strength(left and right). There were significant(p<.001) differences in both health and body type perception according to age.*

Conclusion: *As a result of analyzing each measurement variable according to age, TC, TG, and LDL-C were the highest among blood lipid variables in the 40s, and DBP was high in the hypertension variable. As for diabetes-related variables, FBS and HbA1c appeared higher with increasing age, and sugar intake increased with age. Combining these results, it was found that in each age group, those in their 40s were most at risk for adult disease-related indicators, and it is considered that caution is needed even in those in their 30s.*

Keywords: ***Adult Disease, Blood Lipids, Hypertension, Diabetes, Dyslipidemia***

1. Introduction

Modern society has grown rapidly along with economic development, and the automation of the 4th industry is bringing about changes in lifestyle. These changes in life patterns reduce physical activity and bring about lack of exercise[1]. The reality is that adult diseases are a part of our lives and coexist with the convenience of daily life. Adult diseases are also called lifestyle-related diseases, and are caused by stress, lack of exercise, and imbalance in food intake[2][3]. In addition, since adult diseases do not end with a single disease and have a high possibility of metastasis to other complications, if management is neglected, various diseases occur simultaneously, making the management difficult[4][5]. The activation of the inflammatory response

* The seventh Korea National Health and Nutrition Examination Survey(KNHANES Ⅶ-3). Korea Centers for Disease Control and Prevention (2018).

in the body due to obesity causes changes in the number and activity, which leads to inflammation and dysregulation of the immune system, and changes appear from childhood. It has been proposed as a central mechanism linking obesity with metabolic and vascular complications[6][7]. And the age of onset of adult diseases is also showing a trend of decreasing, and new factors are being discovered as the cause of the disease decreases with age[8].

Hypertension(HT), diabetes(diabetes mellitus, DM), and arteriosclerosis, which are known as the three major adult diseases in the West as well as in Korea, are related to each other and are involved in inducing complications. About 50% of hypertensive patients have hyperinsulinemia or glucose intolerance, whereas more than 80% of type 2 diabetes patients have hypertension. In addition, high levels of plasma triglycerides and low levels of HDL-C have been reported for dyslipidemia induced by insulin resistance and type 2 diabetes[9][10].

The incidence of hypertension increases with age, and the pattern appears around the age of 40. It is mainly known as a degenerative disease of blood vessels in which the inner diameter of blood vessels narrows or decreases in elasticity, and it appears in various age groups in parallel with obesity due to weight gain[11][12]. The prevalence of diabetes in Korea is 14.4% among those over 30 in 2016, and it is one of the top ten causes of death[13]. Currently, the diabetic population in Korea is approaching 5 million, and it is known to cause complications such as heart disease, cerebrovascular disease, neuropathy, foot amputation, blindness, and kidney failure. Diabetic patients need a systematic management system that can prevent or delay complications[14]. Arteriosclerosis is a cause of high blood pressure and can be caused by excessive intake of saturated fat and decreased physical activity. Most of the cardiovascular diseases caused by dyslipidemia are accompanied by atherosclerosis, which is called atherosclerotic dyslipidemia. The prevalence is high in obese people, and the prevalence of metabolic syndrome and dyslipidemia are increasing together[15][16]. These high blood pressure, diabetes, dyslipidemia, etc. are caused by metabolic syndrome, and the onset period appears in the younger age group[17].

Metabolic syndrome in adults includes obesity, insulin resistance, hypertension, dysglycemia, and dyslipidemia, and the characteristics are asymptomatic[18][19]. In order to identify these symptoms, when there are 3 or more abnormal findings among weight gain, waist circumference, triglyceride, HDL-C, high blood pressure, and high fasting blood sugar, it is judged as metabolic syndrome[20]. Therefore, it is necessary to examine the types of items belonging to the metabolic syndrome in Korean adult males over 19 years of age by age.

Therefore, the purpose of this study is to live a healthy life and prevent geriatric diseases in Korean adult males. Data from the National Health and Nutrition Examination Survey conducted by the Korea Centers for Disease Control and Prevention were used to investigate changes in items belonging to the metabolic syndrome in Korean adult males. Through this, the purpose of this study is to find and analyze the indicators related to geriatric diseases according to age of Korean adult males over 19 years of age.

2. Research Method

2.1. Research subject

This study, raw data from the 7th 1-3th years of 2016-2018 conducted by the Ministry of Health and Welfare and the Korea Centers for Disease Control and Prevention(KNHANES 2016-2018; Korea National Health and Nutrition Examination Survey 2016-2018) were used. This is a secondary analysis study. When downloading the data, consent was given to the collection and use of personal information by the Korea Centers for Disease Control and Prevention, and the agreement to comply with statistical data users was agreed. The raw data of the 1st~3rd year of the 2016~2018 7th year(KNHANES 2016~2018; Korea National Health and Nutrition Examination Survey 2016~2018) were downloaded and reprocessed according to the research purpose and used. A total of 8,106 people aged 19 years or older who participated in the 2016-2019

National Health and Nutrition Survey were selected and classified by age group as research subjects. The physical characteristics of the study subjects are as shown in <Table 1>.

Table 1. Physical characteristics of the study subjects.

	Classification	Age(year)	Height(cm)	Weight(kg)	BMI (kg/m^2)	Waist (cm)	(n)
Age	18-29	24.18 ±2.94	175.01 ±5.74	74.50 ±14.06	24.28 ±4.22	83.28 ±10.85	1008
	30-39	34.99 ±2.79	174.89 ±5.92	77.29 ±12.81	25.23 ±3.73	87.13 ±9.56	1286
	40-49	44.48 ±2.81	172.28 ±5.74	74.07 ±10.97	24.93 ±3.32	86.71 ±8.68	1489
	50-59	54.67 ±2.86	169.44 ±5.59	70.51 ±9.57	24.53 ±2.90	86.72 ±7.98	1514
	60-69	64.43 ±2.89	167.37 ±5.64	67.97 ±9.21	24.23 ±2.81	87.07 ±8.16	1426
	70 over	75.52 ±3.56	164.86 ±5.84	64.01 ±9.33	23.52 ±2.97	86.68 ±9.02	1382

Note: Mean and standard deviation.

2.2. Research tools and variables

The National Health and Nutrition Examination Survey for the 1st and 3rd Years of the 7th Term 2016-2018 consists of basic variables, health survey, screening survey, and nutrition survey. In this study, 8106 males aged 19 years or older were extracted based on manna as the basic variable. In addition, the extracted 8106 persons were divided into 6 groups(19-29, 30-39, 40-49, 50-59, 60-69, 70 or more) and used according to the purpose of this study.

In the health survey and screening survey, the factors related to the adult diseases were classified into 5 categories and were consisted of blood lipids, high blood pressure, diabetes, muscular strength, and subjective perception. The specific definitions of the variables used in the study are as follows.

2.2.1. Blood lipids variables

Blood lipids variables: TC(total-cholesterol), HDL-C(high-density lipoprotein), TG(triglycerides) were used without processing the raw data, while LDL-C(low-density lipoprotein) is the formula according to the Friedewald equation Calculated LDL-C was calculated using the formula(LDLc=TC-(TG/5+HDLc)).

2.2.2. Hypertension and diabetes variables

Hypertension-related variables: Systolic blood pressure(SBP), and diastolic blood pressure(DBP) were used as the raw data.

Diabetes-related variables: FBS(Fasting Blood Sugar), HbA1c, and Glucose intake were used as raw data.

2.2.3. Muscular strength and the subjective awareness variables

As for the grip strength, the average value was derived and used by adding the results of the first, second, and third measurements. The subjective health perception was 1 = very good, 2 = good, 3 = average, 4 = bad, 5 = very bad, and the subjective recognition of body type was 1 =

very bad, 2 = slightly skinny, 3 = average, 4 = slightly obese, and 5 = very obese used the raw data for the 5-point Likert scale.

2.3. Data processing

This study used data published in the 2016-2018 National Health and Nutrition Examination Survey. For statistical processing, the mean and standard deviation of all items were calculated using SPSS 27.0 Package. One-way ANOVA was performed to find out the differences in adult disease-related indicators by age group. The post-hoc test for the main effect was performed using the Tukey method. Statistical significance level was based on $p<.05$.

3. Results

The results of analyzing adult disease-related indicators according to age are as follows.

3.1. Blood lipids related variables

The results of analyzing the differences in lipid components according to age are shown in <Table 2>.

Table 2. Comparison of lipid components according to age.

Age(year)	TC(mg/dL)	HDL-C(mg/dL)	TG(mg/dL)	LDL-C(mg/dL)
19-29(a)	181.54±33.26	49.64±10.63	123.57±91.73	107.18±29.86
30-39(b)	199.00±34.89	47.35±10.74	168.95±147.21	117.84±33.43
40-49(c)	202.32±36.75	46.59±11.01	196.82±171.41	116.36±38.32
50-59(d)	193.62±37.90	47.04±11.72	174.91±138.26	111.59±37.86
60-69(e)	184.19±39.09	46.34±11.89	153.98±119.99	107.05±36.47
70 over(f)	176.74±37.24	45.93±11.55	130.06±74.03	104.85±33.89
F-value	101.878***	14.684***	57.985***	29.707***
post-hoc	f<a,e<d<b,c	f,e,d,c<b,c,d,e<a	a,f<e<b,d<c	f,e,a<d<b,c

Note: Mean and standard deviation, a:19-29, b:30-39, c:40-49, d:50-59, e:60-69, f:70 or over.

The differences in lipid-related components according to age are shown in <Table 2>. There was a significant($p<.001$) difference in all measurement items(TC, HDL-C, TG, LDL-C) by age group.

3.2. Hypertension and diabetes-related variables

The results of comparing the differences in the diabetes-related variables according to the presence or absence of obesity are as illustrated in <Table 3>.

<Table 3> shows the differences in hypertension and diabetes-related variables according to age. Significant differences were found in all measurement items by age group.

Table 3. Comparison of the hypertension and diabetes-related variables according to age.

	SBP(mmHg)	DBP(mmHg)	FBS(mg/dL)	HbA1c(%)	Glucose intake(g)
19-29(a)	115.62±11.05	75.12±9.06	91.08±11.47	5.26±.43	74.26±51.56
30-39(b)	116.77±11.73	79.60±9.71	97.06±19.19	5.46±.59	73.88±48.22
40-49(c)	118.51±13.47	81.57±10.14	104.75±27.37	5.70±.91	66.80±50.02
50-59(d)	122.32±15.09	81.31±9.41	108.49±28.85	5.87±.91	64.85±44.95
60-69(e)	124.56±16.37	76.45±9.46	111.20±28.98	6.02±.98	62.27±44.05
70 over(f)	127.36±16.93	70.42±9.91	110.19±28.76	6.05±.94	47.81±33.10
F-value post-hoc	132.007*** a,b<c<d<e<f	277.207*** f<a<e<b<d,c	114.965*** a<b<c<d,e,f	165.438*** a<b<c<d<e,f	54.782*** f<e,d,c<b,a

Note: Mean and standard deviation, a:19-29, b:30-39, c:40-49, d:50-59, e:60-69, f:70 or over.

3.3. Muscular strength and subjective cognition related variables

The differences in muscle strength and subjective cognition-related variables according to age are as shown in <Table 4>. Significant differences were found in all measurement items of muscle strength and subjective cognition by age group.

Table 4. Differences in muscular strength and subjective recognition-related variables.

	Grip(L)kg	Grp(R)kg	Subjective	
			Health awareness	Body type recognition
19-29(a)	36.91±7.05	38.36±7.38	2.78±1.35	3.26±1.11
30-39(b)	39.35±6.94	41.19±7.21	3.08±1.53	3.47±1.12
40-49(c)	38.66±6.82	40.27±7.15	3.17±1.63	3.43±1.10
50-59(d)	36.67±6.39	37.98±6.61	3.28±1.74	3.33±1.10
60-69(e)	33.61±6.27	34.64±6.51	3.17±1.57	3.24±1.10
70 over(f)	27.62±7.01	28.16±7.46	3.32±1.59	3.00±1.16
F-value post-hoc	540.811*** f<e<d,a<b,c	604.013*** f<e<d,a<c<b	16.673*** a<b,c,e<c,e,d,f	31.342*** f<e,a,d<d,c<c,b

Note: Mean and standard deviation, a:19-29, b:30-39, c:40-49, d:50-59, e:60-69, f:70 or over.

4. Discussion

The results of analyzing the differences in indicators related to adult diseases according to age for Korean adults aged 19 years or older are as follows.

4.1. Blood lipids

Analysis of blood lipid-related variables according to age showed significant($p<.001$) differences in all measurement items(TC, HDL-C, TG, LDL-C). TC was lowest among those over 70, followed by those in their 20s, 60s, 50s, 30s, and 40s. HDL-C was highest among those in their 20s, and the lowest among those over 70. TG was the lowest among those in their 20s and 70s, followed by those in their 60s, 30s, 50s, and 40s. LDL-C was lower in people over 70, in their 60s, and in their 20s, followed by those in their 50s, 30s, and 40s.

Overall, TC, TG, and LDL-C were highest in lipid components in their 40s, while HDL-C showed a decreasing trend. These results, when compared with the diagnostic criteria for dyslipidemia in Koreans, in their 40s, the TC is 202.32(mg/dL), which is a high level. In addition, TG and LDL-C showed the highest levels in the group in their 40s, so it is considered that management of lipid variable-related indicators is necessary. Compared with the results of previous studies, the blood TC concentration showed a slight increase at the age of 20 rather than at the age of 10, and the TC concentration showed a high concentration from the 30s to the 50s, and decreased after the age of 60. Also, it is consistent with previous studies that TG and LDL-C increase rapidly from the age of 10 to 40 and then gradually decrease after the age of 60[21]. A 40-year-old male who is overweight has a BMI close to obesity, and dyslipidemia in these obese patients appears in various forms. In particular, it is reported that visceral fat mass and insulin resistance increase due to an increase in VLDL, and a decrease in HDL-C appears[22][23][24].

4.2. Hypertension and diabetes-related variables

The results of analysis of hypertension and diabetes-related variables according to age showed significant differences in all measurement items. People in their 20s and 30s had the lowest SBP, and SBP increased in the order of 40s, 50s, 60s, and 70s or older. DBP was the lowest among those over 70, followed by those in their 20s, 60s, 30s, 50s, and 40s. FBS was lowest in the 20s, and increased in the order of 30s, 40s, 50s, 60s, and 70s. HbA1C was lowest in the 20s, and increased with increasing age. Glucose intake was the lowest in those over 70 years of age, and increased as the age decreased.

Based on these results, we would like to discuss as follows. Hypertension is highest in the elderly and is a risk factor for vascular disease. In this study, SBP gradually increased with increasing age, and DBP was highest in the 40s, but showed a tendency to decrease with increasing age. In general, systolic blood pressure is known to increase with age[25]. Fasting blood glucose and HbA1c are widely used tools to predict diabetes. Diagnosis criteria for diabetes are glycated hemoglobin of 6.5% or more, and if it is 5.7~6.4%, it is reported to increase the risk of diabetes[26]. When fasting blood glucose and HbA1c were compared based on the criteria of previous studies, it was found that the age increased and the levels of fasting blood glucose and HbA1c increased. In this study, blood glucose intake was found to decrease with age. It is known that the total sugar intake in Korea is about 60g per day. It is thought that the younger the age, the higher the sugar intake because of the high sugar intake in adolescents and the high amount of sugar in processed foods[27].

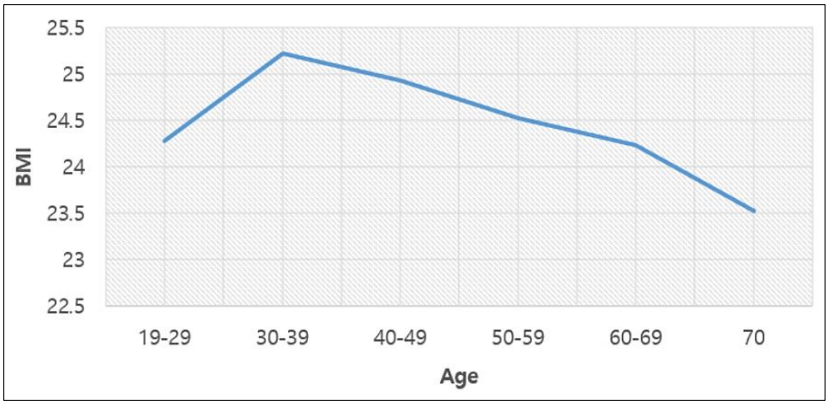
4.3. Muscular strength and subjective recognition-related variables

Significant differences were found in all measurement items of muscle strength and subjective cognition by age group. The left grip was highest in the 30s and 40s, and the lowest in the 20s, 50s, 60s, and 70s and older. The right grip showed the highest in 30's, and the lowest in 40's, 20's, 50's, 60's, and 70's. Subjective health awareness was highest among those in their 20s, and the lowest among those over 70 years of age. In body type recognition, those over 70 years of age showed the lowest, and those in their 30s and 40s showed the lowest. Based on these results, the discussion is as follows. Exercise is known to reduce mortality by preventing geriatric diseases and increasing disease resistance[28][29], and is used as a preventive method for geriatric diseases such as diabetes and high blood pressure[30][31]. In addition, it is reported

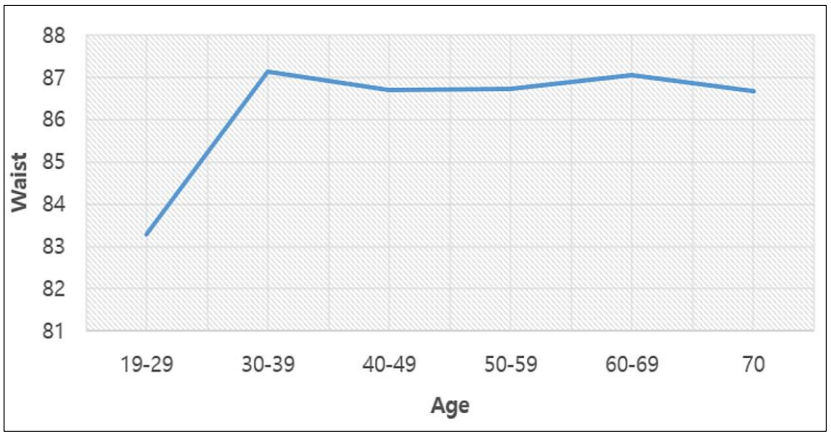
that regular aerobic exercise and strength training can increase insulin sensitivity and blood glucose storage capacity, and decrease the amount of insulin as the blood glucose removal rate increases[32]. In this study, those in their 40s showed the highest muscle strength, and after that, it was found to gradually decrease. Therefore, it is thought that as the age increases, strength training and aerobic exercise are required[33]. Subjective health awareness and body shape perception were positive in their 20s.

4.4. Body mass index, waist and weight by age

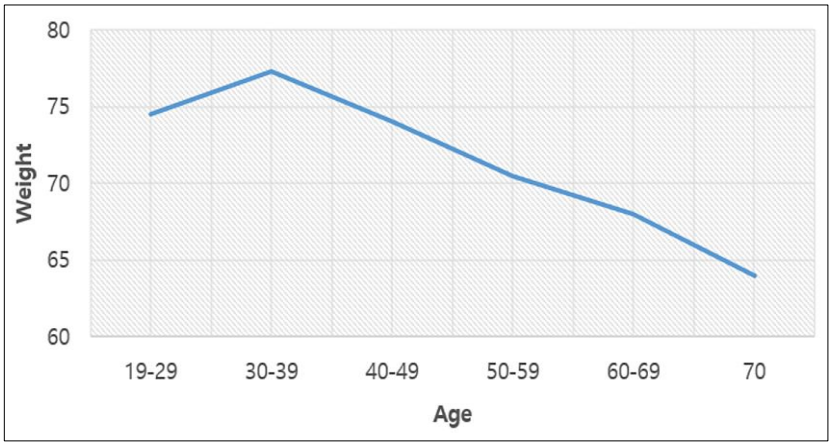
Fugure 1. Comparison of BMI by age.



Fugure 2. Comparison of waist by age.



Fugure 3. Comparison of weight by age.



The comparison of BMI, waist circumference, and weight according to age is shown in <Figure 1>, <Figure 2>, and <Figure 3>. MBI started in the 20s and showed the highest level in the 30s, but showed a tendency to gradually decrease as the age increased. And Waist increased from 20s to 30s, and did not change with age. Lastly, the weight started in the 20s and increased until the 30s, but showed a tendency to gradually decrease with increasing age. Looking at these results, the weight and BMI started to rise in the 20s until the 30s, but on the other hand, the waist circumference did not change even after the 30s. This is considered to be the effect of abdominal subcutaneous fat and visceral fat after the age of 30.

5. Conclusion

This study analyzed the indicators related to geriatric diseases in Korean adult males. As a result of analyzing each measurement variable according to age, TC, TG, and LDL-C were the highest among blood lipid variables in 40~49, and DBP was high in hypertension variable. As for diabetes-related variables, FBS and HbA1c appeared higher with increasing age, and sugar intake increased with age. Combining these results, it was found that in each age group, 40-49 were the most dangerous for geriatric disease-related indicators, and it is thought that attention was also needed in 30-39. In future research, additional analysis of indicators related to gender, activity level, and cancer is required.

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7. Appendix

7.1. Authors contribution

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

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The Relationship between Fan Satisfaction and Loyalty according to the Service Value of Professional Sports Clubs

Hwansuk Choi[1]
Jeonju University, Jeonju, Republic of Korea
Kangwon You[2*]
Jeonju University, Jeonju, Republic of Korea

Abstract

Purpose: *The purpose of this study is to provide basic data that can help in the marketing strategy of professional sports clubs by analyzing the relationship between fan satisfaction and loyalty according to the value of services provided by professional sports clubs.*

Method: *In this study, as of 2022, 290 fans of the four major domestic professional sports(professional baseball, professional soccer, professional volleyball, and professional basketball) were surveyed. Convenience sampling was used as the sampling method. The survey was conducted using the Self-Administration Method. Among the collected questionnaires, 279 questionnaires were used as valid samples, except for data with insincere responses or omissions of some of the contents of the survey. The measurement tool is a questionnaire, and the data processing is the SPSS 23.0 Program, a statistical package program, and frequency analysis, reliability verification, factor analysis, correlation analysis, and multiple regression were used.*

Results: *In this study, as a result of factor analysis and reliability verification, service value, fan satisfaction, and loyalty were each classified as one factor. The reliability of the service value factor was α=.875, the reliability of the fan satisfaction factor was α=.886, and the loyalty factor. The reliability of α=.910 was found. Overall, it was found that the service value of professional sports clubs affects fan satisfaction and loyalty.*

Conclusion: *In this study, service value affects fan satisfaction and loyalty, and professional sports clubs and teams need to provide high-quality services that can increase their liking in order to increase the purchase behavior intention of spectators or fans. In order to do this, it is necessary to accurately identify the attributes and expectations of service quality that are important to them through a satisfaction survey targeting visitors and fans and satisfy them. In addition, efforts to develop unique service quality in the sports industry will not only resolve the cognitive dissonance of trainees, but also affect the behavioral intentions of repurchase and positive word-of-mouth communication.*

Keywords: ***Professional Sports, Service Value, Fan, Satisfaction, Loyalty***

1. Introduction

1.1. Need for research

In the sports industry, along with economic growth, interest in health among modern people has increased due to the increase in leisure time due to the establishment of a five-day work week and the boom in well-being[1][2]. Not only has it received attention as a key growth industry, but its role and weight have greatly expanded. In the case of professional sports including sports, modern people have established themselves as a major factor that promotes time and economic consumption in sports-related fields[3], and this has an effect on increasing consumption of sporting goods along with the continuous increase in direct or indirect sports participants[4][5].

In particular, professional baseball, professional soccer, professional volleyball, and professional basketball are called the four major professional sports in Korea, and they are achieving qualitative growth as well as quantitative growth. In this growth, the emergence of new sports, including competition between professional sports, and the confrontation of new competitive situations, and the competition for attracting customers as well as the performances of clubs and teams within the same event are intensifying. In professional sports, attracting customers or increasing spectators is an important goal, so research and understanding of spectators or fans' consumption patterns is essential[6]. In other words, increasing the audience is an essential element for the successful operation of professional sports. As consumers' service demands are increasingly diversified and advanced, it is essential to strengthen service quality as a differentiated means to secure customers stably[7].

The service value related to the consumption propensity of these spectators or fans refers to what users pay for along with service quality, and can be an important variable in customer satisfaction. Value is a measure of the relative importance and preferred beliefs of an action or object, and is expressed by relative comparison. Customers subjectively perceive positive or negative evaluations through the service process. This level of awareness refers to the trade-off between the quality, benefits, and utilities that customers obtain after experiencing service quality and the price and sacrifice they pay to obtain the service. In addition, service value is a trade-off effect between service quality and the sacrifices made to obtain the service[8]. In addition, satisfaction, repurchase, and the resulting loyalty are important when a product or service meets or exceeds expectations when provided to customers. This is because it appears when there is an abnormality and is closely related to the service value[9][10].

Modern consumption contains more symbolic and social meaning than past consumption, and consumption tends to satisfy the highest level of self-actualization needs in material consumption needs. In addition, the consumption experience perceived by customers includes rational consumption values and experiential consumption values such as pleasure and aesthetic characteristics, and hedonistic values such as pleasure reflect potential entertainment and emotional values. can have an effect[11]. In the face of today's complex and diversified audiences' desires and increasingly competitive competition, various management strategies are required to promote the consumption behavior of spectators and focus on their consumption psychology in order to increase financial income through increasing spectators.

Therefore, the purpose of this study is to provide basic data that can help in the marketing strategy of professional sports clubs by analyzing the relationship between fan satisfaction and loyalty according to the service value provided by professional sports clubs.

1.2. Hypotheses of the research

In this study, the relationship between service value, fan satisfaction, and loyalty in previous studies was investigated before setting the hypothesis, and the contents are as follows.

First, in relation to service value and fan satisfaction, previous studies showed that there is a relationship between service value and fan satisfaction[12][13][14][15].

Second, in relation to service value and loyalty, previous studies showed that there is a relationship between service value and loyalty[16][17][18][19].

Third, in relation to fan satisfaction and loyalty, previous studies showed that there was a relationship between fan satisfaction(customer satisfaction) and loyalty[20][21][22][23][24].

Based on the results of these previous studies, the following hypothesis was established in this study.

H1. Service value will have a significant effect on fan satisfaction.

H2. Service value will have a significant effect on loyalty.

H3. Fan satisfaction will have a significant effect on loyalty.

2. Research Methods

2.1. Subjects and sampling technique

In this study, as of 2022, 290 fans of the four major domestic professional sports(professional baseball, professional soccer, professional volleyball, and professional basketball) were surveyed. Convenience sampling was used as the sampling method. The survey was conducted using the Self-Administration Method. Among the collected questionnaires, 279 questionnaires were used as valid samples, except for data with insincere responses or omissions of some of the contents of the survey.

Table 1. Frequency distributions for the socio-demographic variables.

Variables	Category	Frequency(N=279)
Gender	Male	182
	Female	97
Age	10s	59
	20s	82
	30s	69
	40s	44
	50s or older	25
Marital status	Married	82
	Single	197

2.2. Measuring instrument

The measuring tool used in this study was a questionnaire, and the detailed questionnaire's structure was as follows.

First, for the service value factor, the questionnaire used in the study of Lee[25], Jung & Lee[26], and Lee[27] was modified and used for the purpose of this study.

Second, for the fan satisfaction factor, the questionnaire used in the studies of Kang & Kim & Lee[28] and Kim & Kang[29] was modified and used according to the purpose of this study.

Third, for the loyalty factor, the questionnaire used in the study of Han C & Kim[30], Yoon[31], and Lee Y & Cho S & Choo[32] was modified and used according to the purpose of this study.

Table 2. Construction of the survey questionnaire.

Index	Details	Number of questions
Socio-demographic variables	Gender, age, marital status	3
Service value	Service value	4
Fan satisfaction	Fan satisfaction	3
Loyalty	Loyalty	6
Total		16

2.3. Analysis of data

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

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

Second, to verify the reliability of the questionnaire, the Cronbach's α coefficient was calculated.

Third, factor analysis was conducted to classify the service value, fan satisfaction, and loyalty factors.

Fourth, correlation analysis was performed to examine and understand the conventions between each variable.

Fifth, multiple regression was used to examine and understand the effect of the service value on the fan satisfaction and loyalty.

3. Result

3.1. Validity and reliability of the questionnaire

In this study, factor analysis was conducted to increase the content validity and verify the construct validity. Among the factor analysis techniques, principal component analysis(PCA) was used to highlight the mutual independence between factors. For the factor rotation, the Varimax method, which is an orthogonal rotation, was used. For the factor extraction, only the factors with an eigenvalue of 1.0 or higher were selected, and the factor loading indicating the degree of correlation between each variable and factor was limited to only the items of 0.5 or higher. Reliability was calculated by item analysis for each variable and the Cronbach's α coefficient, which provides reliability of all variables for one concept.

Table 3. Factor analysis and reliability of service value.

Question	Service value
Q. The game was great for the value paid.	.869
Q. The game is worth more than what you pay for.	.816
Q. Watching the game was not worth the price I paid.	.779
Q. It was a good deal considering the cost.	.721
Eigen value	4.684
Pct of var	58.352
Cum pct	58.352
Cronbach's α	.875

In <Table 1>, as a result of factor analysis and reliability verification for the S*ervice* V*alue*, S*ervice* V*alue* factor is classified. The eigenvalue and reliability of the S*ervice* V*alue* factor is 4.684(α=.875), and the ratio to explain all variables was 58.352%.

Table 4. Factor analysis and reliability of fan satisfaction.

Question	Fan satisfaction
Q. Satisfied with the team's results.	.835
Q. Satisfied with the composition of the team.	.788
Q. Satisfied with the club and team.	.721
Eigen value	5.267
Pct of var	56.364
Cum pct	56.364
Cronbach's α	.886

As a result of factor analysis and reliability verification for fan satisfaction in <Table 4>, it was classified as a Service Value factor, and the eigenvalue was 5.267(α=.886), and the ratio to explain all variables was 56.364%.

Table 5. Factor analysis and reliability of loyalty.

Question	Loyalty
Q. I have a lot of pride in the club.	.902
Q. Actively promote the club to people.	.856
Q. I can be proud of my club to others.	.801
Q. If you watch other sports, you should watch this club's game.	.754
Q. I'm proud to watch the club's games.	.732
Q. I will recommend the club to other friends.	.699
Eigen value	5.876
Pct of var	59.178
Cum pct	59.178
Cronbach's α	.910

As a result of factor analysis and reliability verification for loyalty in <Table 5>, it was classified as a loyalty factor, and the eigenvalue was 5.876(α=.910), and the ratio to explain all variables was 59.178%.

Table 6. Correlation analysis.

	Service Value	Fan Satisfaction	Loyalty
Service value	-		
Fan satisfaction	.487***	-	
Loyalty	.425**	.487***	-

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

<Table 6> is the result of correlation analysis using the SPSS Program, and considering the fact that the relationship between all the constituent concepts was positive(+), the direction of the relationship between the variables suggested in the research hypothesis was consistent. Based on such results, in this study, multiple regression may be used appropriately to examine and understand the effect of service value on fan satisfaction and loyalty.

3.2. The effect of service value on fan satisfaction

Table 7. The effect of service value on fan satisfaction.

Independent variable	Dependent variable	Non-standardized coefficient		Standardized coefficient	*t*	R^2	*F*
		b	*Std.E*	*β*			
Service value	Fan satisfaction	.446	.087	.421	3.451***	.547	110.356***

Note: ***p<.001.

<Table 7> shows that the service value factor of service value has a significant effect on fan satisfaction, and the coefficient of determination R^2=.547, with an explanatory power of 54.7%.

3.3. The effect of service value on loyalty

Table 8. The effect of service value on loyalty.

Independent variable	Dependent variable	Non-standardized coefficient		Standardized coefficient	*t*	R^2	*F*
		b	*Std.E*	*β*			
Service value	Loyalty	.460	.075	.436	4.257***	.489	95.869***

Note: ***p<.001.

<Table 8> shows that the service value factor of service value has a significant effect on loyalty, and the coefficient of determination R^2=.489, with an explanatory power of 48.9%.

3.4. The effect of fan satisfaction on loyalty

Table 9. The effect of service value on loyalty.

Independent variable	Dependent variable	Non-standardized coefficient		Standardized coefficient	*t*	R^2	*F*
		b	*Std.E*	*β*			
Fan satisfaction	Loyalty	.384	.071	377	3.467***	.516	99.128***

Note: ***p<.001.

<Table 9> shows that the service value factor of fan satisfaction has a significant effect on loyalty, and the coefficient of determination R^2=.516, with an explanatory power of 51.6%.

4. Discussion

In this study, it was found that service value affects fan satisfaction and loyalty. The results of this study showed that ski resort service quality, service value, customer satisfaction, and behavioral intention were affected, and that there was a relationship between service quality, perceived service value, satisfaction, and behavioral intention of the marine leisure sports experience class[33][34][35][36]. It was found that the service value of sporting goods affects purchase satisfaction and future consumption behavior[37], and the service value affects viewing satisfaction and consumer behavior[38][39][40]. Service value also affects customer loyalty[41], and service value has been shown to affect customer satisfaction, trust, and re-visit intention[42]. The results of these previous studies are consistent with the results of this study and have sufficient explanatory power.

Because service value affects behavioral intentions such as customer satisfaction and loyalty, professional sports clubs and teams need to provide quality services to increase the purchasing behavior of visitors or fans[43][44][45]. Since service value affects individual attitudes and behaviors depending on whether they are positively valued due to their investment benefits and benefits, clubs and teams should strive to improve the most fundamental performance, discover and nurture franchise stars, and ultimately improve satisfaction.

In addition, based on the service education of professional sports clubs and teams, it is also necessary to give continuous interest to spectators and fans rather than simply providing services, and to give trust and trust to build relationships with spectators and fans. In addition, it is necessary to realize the establishment of various service training systems for employees so that training can be provided to employees in a timely and timely manner.

In order to effectively increase the satisfaction and revisit and recommendation intention through communication with the audience or fans, it is necessary to improve the service value, which is a prerequisite for satisfaction and satisfaction and satisfaction.

These efforts to improve service quality and service value will not only have a comparative advantage in the sports industry, but also have a positive effect on repurchase intention, including the purchase intention of visitors and fans, and the behavioral intention of positive word of mouth communication.

5. Conclusion

The purpose of this study is to provide basic data that can help professional sports clubs' marketing strategies by analyzing the relationship between fan satisfaction and loyalty according to the value of services provided by professional sports clubs.

In this study, as of 2022, 290 fans of the four major domestic professional sports(professional baseball, professional soccer, professional volleyball, and professional basketball) were surveyed. Convenience sampling was used as the sampling method. The survey was conducted using the Self-Administration Method. Among the collected questionnaires, 279 questionnaires were used as valid samples, except for data with insincere responses or omissions of some of the contents of the survey.

The measurement tool is a questionnaire, and the data processing is the SPSS 23.0 Program, a statistical package program, and frequency analysis, reliability verification, factor analysis, correlation analysis, and multiple regression were used.

The conclusions obtained through this research process are as follows.

First, service value affects fan satisfaction.
Second, service value affects loyalty.
Third, fan satisfaction affects loyalty.

Therefore, it can be seen that the service value of professional sports clubs affects fan satisfaction and loyalty. Therefore, it can be seen that the viewing satisfaction is formed by the customer value, which is symbolized by the ratio of the cost sacrificed to the audience or the fans and the benefit that can be obtained. Therefore, in order to increase the service value perceived by spectators or fans, each professional club must ultimately strive to improve the service value and ultimately increase satisfaction by providing transaction efficiency through improvement of performance and inventory of facilities and environmental factors.

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7. Appendix

7.1. Author's contribution

	Initial name	Contribution
Lead Author	HC	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Corresponding Author*	KY	-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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An Analysis of Perceived Value, Happiness, and Revisit Intention of eSports Competition Watch: A Study on the Disabled and Non-Disabled Persons

Kyunghwan Choi[1]

Kyungsung University, Busan, Republic of Korea

Boseob Heo[2*]

Kosin University, Busan, Republic of Korea

Abstract

Purpose: *This study analyzed and identified differences in perceived value, happiness, and revisit intention according to eSports game viewing for the disabled and non-disabled. Accordingly, it is meaningful to provide basic data for effectiveness and expansion of the base of eSports for the disabled as an eSports viewing market.*

Method: *For about six months from January to June 2022, visitors to the competition organized by the Korea eSports Federation for the Disabled and the Korea eSports Association(Presidential Boat Amateur, D-war, Heungtaryeong eSports Competition) were selected, and a total of 384 copies were distributed for the final analysis. As for the data processing method, frequency analysis, factor analysis, reliability analysis, and t-test were performed. And the following conclusions were drawn.*

Results: *First, the differences in perceived value, happiness, and revisit intention of eSports visitors according to gender were not statistically significant.*

Second, there was a statistically significant difference in perceived value and happiness factors according to the presence or absence of disabilities of eSports visitors, but there was no significant difference in revisit intention.

Conclusion: *Through the results of this study, the effectiveness of e-sports viewing was confirmed. In addition, it was confirmed that there was no difference in perceived beliefs and attitudes between the disabled and the non-disabled. Accordingly, e-sports research for the disabled should be continuously conducted.*

Keywords: ***eSports, Disabled, Non-Disabled, Happiness, Revisit Intention***

1. Introduction

eSports is recognized as a new sport in the 21st century, and the number of participants is gradually increasing[1]. In addition, the public's perception of eSports is being accepted as a new sport as eSports continues to be adopted as an official event of the 2022 Hangzhou Asian Games following the adoption of the 2018 Jakarta-Palembang Asian Games pilot event in Indonesia[2]. Based on this, the size of the eSports industry is also growing every year, and eSports is the only sport that is booming and growing amid social changes such as COVID-19[3].

As eSports is growing at a rapid pace every year, only the industrial aspect is emphasized, so academic research on eSports and research on the disabled who are allowed universal access are very insufficient[4]. The academic study of eSports is a study that establishes an academic foundation while acknowledging the growth potential and industrial potential of eSports by many scholars[5][6][7]. Although it is gradually increasing, studies proving the effectiveness of eSports for the disabled in Korea are very incomplete.

As a result of a search for ‘eSports’ based on the current academic research information service(RISS), a total of ‘2,243’ cases were found. However, as a result of changing the search term to ‘eSports for the disabled’, a total of ‘11 cases’ were found.

The total number of persons with disabilities registered in Korea is 2.63 million, accounting for 5.1% of the total population, or 1 in 20 persons[8]. In order to build an integrated sports environment that the current government promotes and suggests future directions, it is judged that the provision of a sports environment in which participants can participate and practical research should be supported.

The advantage of eSports different from traditional sports is that they can participate equally without distinction between disabled and non-disabled people, and can watch online and in person at the same time[9]. In this context, in accordance with the government's eSports promotion policy, eSports stadiums are being prepared in each region of the country. As of 2022, it is in operation in Busan, Daejeon, and Gwangju, followed by Seongnam and Jinju City under construction. As such, as eSports stadiums are established in each region, a plan is being prepared to draw closer to local residents and at the same time attract external tourists.

Meanwhile, he argued that sports tourism had a very positive effect on perceived value and satisfaction[10], It was also announced that sports tourism should be activated because it greatly contributes to the image and satisfaction of tourist destinations[11]. As such, in the field of sports, research on sports tourism importance of sports tourism is being emphasized[12][13][14].

However, in the field of eSports, despite the fact that eSports stadiums are permanently operated in each major city, research on eSports tourism is insufficient, and research on people with disabilities is currently non-existent, raising the need for research.

And leisure activities of the disabled and non-disabled people were investigated through the survey on leisure activities of the disabled and non-disabled[15]. As a result of the fact-finding survey, out of 151 people with disabilities, 101(66.9%) reported that they engage in leisure activities through weekend tours, suggesting an indicator of tourism participation. And a result of a survey on whether 309 people with disabilities participated in eSports, 76.7%, or 237 people, took part[4].

Taken together, it can be seen that the disabled in Korea participates in e-sports as a universal access and leisure activity, and participates in sports tourism as a weekend leisure activity. However, despite this, eSports is currently focused on research on non-disabled people, and research on disabled people is insufficient. Accordingly, this study analyzed the differences in perceived value, happiness, and revisit intention for the disabled and non-disabled people who participate in eSports games held nationwide, and analyzed the effectiveness of eSports and its justification as a new tourism product. It is meaningful to prove

Specific research questions for conducting research under these research objectives are as follows.

First, the difference in perceived value, happiness, and revisit intention of eSports spectators according to gender is investigated.

Second, the difference in perceived value, happiness, and revisit intention of eSports viewers according to the presence or absence of disability is investigated.

2. Research Method

This study was conducted for visitors who visited the competitions(Presidential Cup amateur, D-war, Heungtaryeongbae e-sports competition) hosted by the Korea E-Sports Federation for the Disabled and the Korea e-Sports Association for about 6 months from January to June 2022. was selected, and the convenience sampling method was used among non-probability sampling methods.

After explaining the purpose and purpose of this study to the population, questionnaires were distributed. A total of 450 questionnaires were distributed and 400 copies were collected. Of the collected questionnaires, 384 copies were used for the final analysis, excluding 16 questionnaires that were answered insincerely. The general characteristics of the study subjects are shown in <Table 1>.

At gender, 228 people(59.4%) were male, 156 people(40.6%) were female, and the male ratio was high. With 106 university students(27.6%) and 136 university graduates(35.4%), the highest percentage of university graduates.

There were 177 people(46.1%) with a disability and 207 people(53.9%) without a disability. Types of disability were: retardation in 67(37.9%), hearing in 59(16.4%), mental in 10(5.6%), development in 21(11.9%), intellectual in 48(27.1%), brain lesion in 2(1.1%).) showed the highest rate of physical disability.

By area of residence, 52 people in Seoul(13.5%), 79 people in Gyeonggi-do(20.6%), 107 people in Chungcheong-do(27.9%), 54 people in Jeolla-do(14.1%), 57 people in Gyeongsang-do(14.8%), 35 people in Gangwon-do(7.1%) appeared.

Table 1. Demographic characteristics.

Division	Contents	Personnel	Frequency
Gender	Male	228	59.4
	Female	156	40.6
Disability	Yes	177	46.1
	No	207	53.9
Disability type	Physically disabled	67	37.9
	Deaf	29	16.4
	Mentally disabled	10	5.6
	Developmentally disabled	21	11.9
	Intellectually disabled	48	27.1
	Brain disorder	2	1.1
Residence	Seoul	52	13.5
	Gyeonggi-do	79	20.6
	Chungcheong-do	107	27.9
	Jeolla-do	54	14.1
	Gyeongsang-do	57	14.8
	Gangwon-do	35	7.1
Education	Middle school graduation	40	10.4
	High school graduation	102	26.6
	Attending university	106	27.6
	University graduation	136	35.4
Sum		384	100

3. Research Tool

The variables of this study consisted of three variables: perceived value, happiness, and revisit intention. All items were measured on a 7point Likert scale. The perceived value of the questionnaire it was constructed based on the items used[16][17]. Feeling of happiness[18], revisit intention[19] It was constructed based on the items used.

4. Verification of Validity and Reliability of Measurement Tools

Exploratory factor analysis was performed to verify the validity of the measurement tool used in this study. Only items with factor loading values of .5 or higher were selected through factor analysis, and reliability analysis was performed to verify reliability.

<Table 2> shows the results of the exploratory factor analysis on perceived value, happiness, and revisit intention. The items measuring the perceived value were a single factor with an eigenvalue of 3.646, the cumulative variance ratio of 91.149%, and the items measuring the happiness factor were

a single factor with an eigenvalue of 6.261, the cumulative variance ratio of 89.444%, and revisit intention. As a single factor, the eigenvalue was 2.627 and the cumulative variance ratio was 87.564%, indicating that it was measured properly.

Table 2. Results of exploratory factor analysis on perceived value, happiness, and revisit intention.

Questionnaire	Perceived value
Variable 1	.932
Variable 3	.963
Variable 2	.975
Variable 4	.948
Eigenvalue	3.646
Dispersion(%)	91.149
Accumulate(%)	91.149
Cronbach's α	.967
KMO=.843, Bartlett's test of sphericity test:x^2 =628.980, df=6, p=.000	
Questionnaire	Happiness
Variable 1	.939
Variable 5	.948
Variable 3	.947
Variable 7	.949
Variable 2	.962
Variable 4	.949
Variable 6	.927
Eigenvalue	6.261
Dispersion(%)	89.444
Accumulate(%)	89.444
Cronbach's α	.980
KMO=.891, Bartlett's test of sphericity test:x^2 = 1478.224, df=21, p=.000	
Questionnaire	Revisit İntention
Variable 1	.943
Variable 2	.933
Variable 3	.931
Eigenvalue	2.627
Dispersion(%)	87.564
Accumulate(%)	87.564
Cronbach's α	.929
KMO=.764, Bartlett's test of sphericity test:x^2 = 274.249, df=3, p=.000	

5. Data Processing Method

The data processing method of this study was performed using the SPSS 21.0 program. First, a frequency analysis was performed to confirm the demographic characteristics of the subjects. Second, reliability analysis was performed to verify reliability. Third, an exploratory factor analysis was performed to verify the validity of the items used in this study. Fourth, a t-test was conducted to determine the difference due to gender and disability.

6. Research Results

6.1. Analysis of differences in perceived value, happiness, and revisit intention by gender of eSports spectators

<Table 3> shows the results of the t-test to examine the differences in perceived value, happiness, and revisit intention according to gender in watching eSports games. As a result of the analysis, it was found that there was no statistical significance in perceived value, happiness, and revisit intention according to gender. In other words, it can be seen that the perceived value, happiness, and revisit intention are significantly perceived regardless of gender.

Table 3. Differences in perceived value, happiness, and revisit intention according to gender.

Variable	Gender	M(SD)	t	*p*
Perceived value	Male	7.14±2.26	1.84	.068
	Female	6.37±2.25		
Happiness	Male	5.34±1.72	1.32	.196
	Female	4.92±1.77		
Revisit	Male	5.06±1.67	.900	.370
	Female	4.79±1.75		

6.2. Difference analysis of perceived value, happiness, and revisit intention according to the presence or absence of disability

<Table 4> shows the results of the t-test to examine the differences in perceived value, happiness, and revisit intention according to the presence or absence of disability in watching eSports games. As a result of the analysis, it was found that there were differences in perceived value and happiness factors according to the presence or absence of disability, but the intention to revisit was not statistically significant.

Table 4. Differences in perceived value, happiness, and revisit intention according to the presence or absence of a disability.

Variable	Disability	M(SD)	t	*p*
Perceived value	Yes	7.42±1.66	3.78	.000
	No	5.89±2.68		
Happiness	Yes	5.49±1.46	2.59	.011
	No	4.66±1.92		
Revisit	Yes	6.23±1.29	1.01	.310
	No	6.08±1.57		

7. Argument

This study investigated the effects of watching e-sports games on perceived value, happiness, and revisit intention.

First, it was found that there was no statistical significance in the perceived value, happiness, and revisit intention according to the gender of the visitor. It was found that there was no difference in perceived value, happiness, and revisit intention, which is the desire to visit again, according to gender in watching e-sports games. He argued that there was no difference in perceived value by gender[20][21], they also argued that there was no gender difference in perception of happiness[22][23][24]. Finally the study also supports the results of this study by arguing that revisit intention is not statistically significant according to gender[25][26][27].

Looking at the study results in detail, it can be seen that the average value of the three factors, perceived value, happiness, and revisit intention, was 4.7 out of 7, indicating a very positive result.

This means that eSports spectators perceived the value of e-sports while watching the game, and it is judged that this was the result of feeling happy. And because of this satisfaction, it is judged that the belief that one wants to visit again has continued to appear. The results of this study prove the effectiveness of eSports as a viewing product and suggest the expandability of eSports viewing in the future. Based on these results, eSports marketers and working-level officials should recognize the importance of viewing products and establish alternatives to induce visitors. If more visitors visit and feel a sense of value and happiness, the perception of eSports will improve and industrial development will take place.

Second, as a result of analyzing the differences in perceived value, euphoria, and revisit intention according to the presence or absence of disability, perceived value and euphoria factors were found to be statistically significant, and there was no significant difference in revisit intention. This shows that there is no correlation between the presence or absence of a disability and the intention to revisit, and the attitude of revisiting regardless of the presence or absence of a disability can be confirmed. Also, as a result of confirming the difference between perceived value and happiness, it was found that the disabled felt the perceived value and happiness more than the non-disabled.

As a result of studying the attitude according to the presence or absence of disability in the advertising model, it was argued that the average value of the attitude was higher for the disabled than the non-disabled[28]. The study also supports the results of this study by arguing that the disabled group is higher because the cognitive factor structure is different when comparing the disabled group and the non-disabled group[29][30].

The results of this study suggest two meanings. Disabled people are suggesting the legitimacy of e-sports spectators. As the current eSports market is being researched and conducted for non-disabled people, the disabled have been marginalized. However, after the results of this study, it is necessary to expand the study of eSports viewing and convenience for the disabled as it is recognized as a spectator.

It also suggests that disabled people perceive a higher sense of value and happiness through e-sports than non-disabled people. The result is that the eSports market in which people with disabilities participate can lead to feedback and positive beliefs and behavioral intentions. Based on the results of this study, eSports marketers and working people should establish a plan to induce viewing for the disabled in order to expand the e-sports market.

It is judged that the effect will be even greater if the convenience facilities are expanded to allow access to actively induce the disabled and the cognitive ability is increased by using assistive devices for the hearing and intellectual disabilities.

8. Results and Suggestions

This study analyzed and identified differences in perceived value, happiness, and revisit intention according to eSports game viewing for the disabled and non-disabled. Accordingly, it is meaningful to provide basic data for effectiveness and expansion of the base of eSports for the disabled as an eSports viewing market

For about six months from January to June 2022, visitors to the competition organized by the Korea eSports Federation for the Disabled and the Korea eSports Association(Presidential Cup Amateur, D-war, Heungtaryeong Cup eSports Competition) were selected, and a total of 384 copies were distributed for the final analysis. As for the data processing method, frequency analysis, factor analysis, reliability analysis, and t-test were performed. And the following conclusions were drawn.

First, the differences in perceived value, happiness, and revisit intention of eSports visitors according to gender were not statistically significant.

Second, there was a statistically significant difference in perceived value and happiness factors according to the presence or absence of disabilities of eSports visitors, but there was no significant difference in revisit intention.

Based on the limitations of this study, I would like to suggest the following directions for future research.

First, since this study was conducted for visitors who visited the e-sports stadium from January to June 2022, it is somewhat difficult to generalize. Therefore, it is judged that more diverse results will be obtained if a longer period is set in the follow-up study and the study is conducted including Seongnam and Jinju.

Second, although this study analyzed the differences between disabled and non-disabled people, it is somewhat difficult to generalize to all disabled people because the differences in the types of disabilities were not identified. Therefore, it is judged that the follow-up study will show more colorful results if the difference according to the type of disability is identified.

Third, this study is somewhat difficult to generalize because it did not identify differences according to e-sports events. Therefore, in the follow-up study, it is judged that it will be a more meaningful study if various factors such as perceived value and happiness according to e-sports are identified.

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10. Appendix

10.1. Authors contribution

	Initial name	Contribution
Lead Author	KC	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑ -Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Corresponding Author*	BH	-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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Corresponding author*
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Effects of Transformational Leadership of Baseball Leaders on Sports Confidence

Daewon Yoon

Chosun University, Gwangju, Republic of Korea

Abstract

Purpose: *This study investigated the effect of transformational leadership of baseball leaders on sports confidence.*

Method: *The population was selected from players participating in the tournament hosted by the Korea Baseball Softball Association for about three months from May to August 2022, and a questionnaire was distributed and a total of 231 copies were used for the final analysis. For data processing methods, frequency analysis, exploratory factor analysis, reliability analysis, correlation analysis, multiple, and simple regression analysis were performed using SPSS 21.0, and the following conclusions were drawn based on the results.*

Results: *First, it was found that the charismatic factor of the transformational leadership of baseball leaders had a significant effect on sports confidence(proof of ability).*

Second, the intellectual stimulation and charisma factors of transformational leadership of baseball leaders were found to have a significant effect on sports confidence(social support).

Third, the intellectual stimulation and charisma factors of transformational leadership of baseball leaders were found to have a significant effect on sports confidence(leadership).

Fourth, the consideration factors of the transformational leadership of baseball leaders were found to have a significant effect on sports confidence(physical/mental factors).

Conclusion: *It was found that the transformational leadership of baseball coaches had a very significant effect on sports confidence(proof of ability, social support, leadership, physical/mental preparation). According to the results of this study, the leadership of a leader is very necessary in order to activate and expand the base of baseball, and to maximize the potential of baseball players. Stimulation through transformational leadership will act as a major factor in improving performance for athletes, and it is judged that it will have a very significant effect on the intention to continue exercise.*

Keywords: ***Baseball, Sports Confidence, Transformational Leadership, Leadership, Sports***

1. Introduction

Baseball is in which is the most competitive sport in the world, it is important to outperform the opposing team(players), maximize their potential to win and achieve their individual goals, and work on the game[1]. Among these, effective leadership of baseball coaches is required to awaken the potential of baseball players, demonstrate them, and win the game[2].

Also, who argued that leadership of leadership is an important factor in winning the competition in the situation of sports competition[3]. did. In this way, research on the leadership of sports leaders was found[4][5][6].

In this context, transformational leadership is most often described by sports leaders as the type of leadership that enables leaders to present potential to athletes and members, charge fraud, and achieve planned objectives. It is the leadership used for argued that the inotropic leadership of golf instructors has a significant impact on educational satisfaction and technical satisfaction[7][8], and also argued that it is related[9]. emphasized the importance of transformational leadership.

Among them stressed that the transformative leadership of table tennis instructors has a positive effect on sports confidence, but sports confidence is not only about positive beliefs gained through sports activities[10], defined as imposing self-confidence[11].

Research on sports confidence has been studied continuously, and pointed out that the sports confidence of golf participants had a positive effect on intention to continue exercise[12]. He insisted that self-confidence should be actively induced. In addition, also mentioned that the sports confidence of young taekwondo players is closely related to their competitiveness, and that sports confidence should be maximized[13]. In this way, research that has investigated the effectiveness of sports confidence in the field of sports are being conducted continuously[14][15][16][17].

In this way, the relationship between the importance of sports leader's leadership styles and sports confidence has been investigated, but in most specific sports, the relationship between two eccentrics has been investigated. The research that proves the effectiveness of argued that baseball coaches' transformative leadership can bring out the satisfaction of players and is very useful for competitiveness, thus it should be actively utilized[18]. However, research on the leadership of baseball coaches is mostly based on research in the 2010s, and there is no research that investigates leadership accompanying social changes such as Corona 19(COVID-19).

It is the role of the leader to bring out the latent potential of the players in order to dominate the world and expand professional baseball and casual baseball. By presenting a vision to the players and appropriately using factors such as charisma and consideration, we must strive to maximize the players' abilities and lead to competitiveness.

Therefore, the purpose of this study is to elucidate the impact of baseball coaches' transformative leadership on sports self-confidence, and to revitalize baseball participation and provide empirical basic materials. The research problems to achieve these research objectives are as follows.

First, the transformational leadership of baseball leaders will affect sports confidence(proof of ability).

Second, the transformational leadership of baseball leaders will affect sports confidence(social support).

Third, transformational leadership of baseball leaders will affect sports confidence(leadership).

Fourth, transformational leadership of baseball leaders will affect sports confidence(physical/mental preparation).

2. Research Method

In this study, the population was selected from players who participated in the tournament hosted by the Korea Baseball Softball Association from May to August 2022, and the convenience sampling method was used among non-probability sampling methods. After explaining the purpose and purpose of this study to the players, questionnaires were distributed. A total of 240 questionnaires were distributed and 236 copies were recovered, and 231 copies were used for the final analysis, excluding 5 questionnaires that were answered insincerely. The general characteristics of the study subjects are shown in <Table 1>.

By gender, 231 people(100%) were male, and 33 people(14.3%) were enrolled in middle school, 117 people(50.7%) were enrolled in high school, and 81 people(35.0%) were enrolled in university. As for

the residential area, 42 people in Seoul(18.2%), 99 people in Gyeonggi-do(42.9%), 18 people in Chungcheong-do(7.8%), 52 people in Jeolla-do(22.5%), and 20 people in Gyeongsang-do(8.6%) were found.

Table 1. Demographic characteristics.

Division	Contents	Personnel	Frequency(%)
Gender	Male	231	100
School	Middle	33	14.3
	High	117	50.7
	University	81	35.0
Residence	Seoul	42	18.2
	Gyeonggi-do	99	42.9
	Chungcheong-do	18	7.8
	Jeolla-do	52	22.5
	Gyeongsang-do	20	8.6
Sum		231	100

3. Research Tool

The variables of this study consisted of two variables: transformational leadership(charisma, consideration, intellectual stimulation) and sports confidence(proof of ability, social support, leadership, physical/mental preparation), and all items were measured on a 7-point Likert. As a questionnaire, transformational leadership was based on the research of and the questions used in the research of were used[19][20]. For sports confidence, the questions used in the study of were modified and secured for this study[21].

Therefore, as for the finally used items, a total of 27 items were used in this study: 3 items on demographics, 11 items on transformational leadership, and 13 items on sports confidence.

4. Verification of Validity and Reliability of Measurement Tools

Exploratory factor analysis was performed to verify the validity of the measurement tool used in this study. Only items with factor loading values of .5 or higher were selected through factor analysis, and reliability analysis was performed to verify reliability.

The results of the exploratory factor analysis on the transformational leadership factors of baseball leaders are shown in <Table 2>. The items measuring the transformational leadership factor are three sub-factors. First, the eigenvalue of the charismatic factor was 3.511, the variance was 31.920%, and the second, the eigenvalue of the consideration factor was 3.338 and the variance was 30.347%. Third, the intellectual stimulation factor had an eigenvalue of 2.747 and a variance of 24.974%, and a cumulative variance ratio of 87.241%, indicating that the items measuring the transformational leadership of baseball leaders were measured relatively properly.

Table 2. Exploratory factor analysis result.

Questionnaire	Charisma	Consideration	Intellectual stimulation
Charisma 1	.949	.220	.038
Charisma 2	.946	.241	.042
Charisma 3	.927	.257	.020
Charisma 4	.884	.275	.035
Consideration1	.292	.883	.106
Consideration2	.270	.880	.108
Consideration3	.196	.873	.122

Consideration4	.217	.860	.069
Stimulation1	.031	.075	.965
Stimulation2	.044	.137	.950
Stimulation3	.024	.101	.929
Eigenvalue	3.511	3.338	2.747
Dispersion(%)	31.920	30.347	24.974
Accumulate(%)	31.920	62.267	87.241
Cronbach's α	.970	.932	.957
KMO=.843, Bartlett's test of sphericity test: x^2 = 2927.460, df=55, p=.000			

<Table 3> shows the results of the exploratory factor analysis for sports confidence factors. The items measuring the sports confidence factor are a total of 4 sub-factors. First, the ability proof factor had an eigenvalue of 2.764, the variance was 21.261%, and second, the social support factor had an eigenvalue of 2.664 and a variance of 20.493%. Third, the eigenvalue of the leadership factor was 2.626, the variance was 20.201%, and fourth, the eigenvalue of the physical/mental preparation factor was 2.484 and the variance was 19.106, with a cumulative variance ratio of 81.062%, indicating that the questions measuring sports confidence were relatively reasonable. It can be seen that it has been measured.

Table 3. Results of exploratory factor analysis on sports confidence.

Questionnaire	Proof of ability	Social support	Leadership	Physical/mental preparation
Proof of ability1	.946	.140	.144	.041
Proof of ability2	.938	.104	.185	.072
Proof of ability3	.898	.092	.168	101
Social support1	.128	.894	.292	.026
Social support2	.145	.824	.297	.128
Social support3	-.086	.811	.082	-.102
Social support4	.217	.646	-.096	.056
Leadership1	.165	.094	.894	.003
Leadership2	.163	.188	.883	.025
Leadership3	.141	.118	.879	.000
Preparation1	.077	.033	.040	.914
Preparation2	.012	-.065	.012	.912
Preparation3	.104	.099	-.022	.877
Eigenvalue	2.764	2.664	2.626	2.484
Dispersion(%)	21.261	20.493	20.201	19.106
Accumulate(%)	21.261	41.755	61.956	81.062
Cronbach's α	.854	.898	.925	.888
KMO=.753, Bartlett's test of sphericity test: x^2= 2601.409, df=78, p=.000				

5. Data Processing Method

The data processing method of this study was performed using the SPSS 21.0 program. First, a frequency analysis was performed to confirm the demographic characteristics of the survey subjects. Second, reliability analysis was performed to verify reliability. Third, an exploratory factor analysis was performed to verify the validity of the items used in this study. Fourth, correlation analysis and multiple regression analysis were performed to examine the correlation between variables.

6. Research Results

6.1. Correlation analysis

<Table 4> shows the results of correlation analysis to examine the correlation between variables. Correlation values for all variables ranged from a minimum of .136 to a maximum of .706, indicating that there is a statistically significant correlation.

Table 4. Correlation analysis.

Variable	Charisma	Consideration	Intellectual stimulation	Proof of ability	Social support	Leadership	Physical/ mental preparation
Charisma	.496**	1					
Consideration	.208**	.155*	1				
Intellectual stimulation	.481**	.183**	.152*	1			
Proof of ability	.232**	.136*	.489**	.193**	1		
Social support	.326**	.214**	.706**	.321**	.372**	1	
Leadership preparation	.304**	.199**	.300**	.180**	.303**	.236**	1

Note: **p<.01.

6.2. Effect of transformational leadership of baseball leaders on sports confidence(proof of ability)

Multiple regression analysis was performed to analyze the effect of baseball coach's transformational leadership on sports confidence(proof of ability), and the results are shown in <Table 5>. As a result of the analysis, it was found that the charisma(β=.508) factor had a significant effect among the transformational leadership factors.

Table 5. Effect of transformational leadership on sports confidence(proof of competence).

Variable	B	SE	β	t	p
Charisma	.397	.053	.508	7.523	.000
Consideration	.055	.047	.079	1.175	.241
Intellectual stimulation	.046	.046	.059	.991	.323
R=.489. R^2= 2.29, F= 23.752***					

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

6.3. Effect of transformational leadership of baseball leaders on sports confidence(social support)

Multiple regression analysis was performed to analyze the effect of baseball coach's transformational leadership on sports confidence(social support), and the results are shown in <Table 6>. As a result of the analysis, it was found that among the transformational leadership factors, intellectual stimulation(β=.461) and charisma(β=.138) had a significant effect on sports confidence(social support) in the order.

Table 6. Effect of transformational leadership on sports confidence(social support).

Variable	B	SE	β	t	p
Charisma	.146	.071	.138	2.069	.040
Consideration	.004	.063	.004	.061	.951
Intellectual stimulation	.487	.062	.461	7.867	.000
R=.507. R^2= .247, F= 26.176***					

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

6.4. Effect of transformational leadership of baseball leaders on sports confidence(leadership)

Multiple regression analysis was performed to analyze the effect of baseball leaders' transformative leadership on sports confidence(leadership), and the results are shown in <Table 7>. As a result of the analysis, it was found that among the transformational leadership factors, intellectual stimulation(β=.666) and charisma(β=.175) had a significant effect on sports confidence(leadership) in the order.

Table 7. Effect of transformational leadership on sports confidence(leadership).

Variable	B	SE	β	t	p
Transformative	.189	.057	.175	3.312	.001
Servant	.023	.051	.024	.462	.645
Intellectual stimulation	.718	.050	.66	14.33	.000
R=.730. R^2= .527, F= 86.301***					

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

6.5. Effect of transformational leadership of baseball leaders on sports confidence (physical/mental preparation)

Multiple regression analysis was performed to analyze the effect of baseball coach's transformational leadership on sports confidence(physical/mental preparation), and the results are shown in <Table 8>. As a result of the analysis, it was found that among the transformational leadership factors, consideration(β=.245) and charisma(β=.230) had a significant effect on sports confidence(physical/mental preparation) in the order.

Table 8. Effect of transformational leadership on sports confidence(physical/mental preparation).

Variable	B	SE	β	t	p
Transformative	.213	.066	.230	3.225	.001
Servant	.226	.058	.245	3.918	.000
Intellectual stimulation	.039	.059	.047	.671	.503
R=.391. R^2= .142, F= 13.659***					

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

7. Argument

This study investigated the relationship between the transformative leadership of baseball leaders and the effect on baseball players' sports confidence and intends to discuss as follows through the results of the study.

First, the transformational leadership(charisma) factor of baseball leaders appeared as an enemy that had a positive effect on ability demonstration. Accordingly supports the results of this study by arguing that the transformational leadership of middle and high school taekwondo instructors greatly contributes to sports confidence[22].

These results are judged to have appeared to provide an environment in which baseball players can immerse themselves in training and clear their minds due to the charismatic factors of baseball leaders. Now, in order to realize the potential of baseball players, achieve training performance, and win games, it will be necessary to stimulate the charismatic factor of transformational leadership. The charismatic factor of transformational leadership is a factor that signifies the authority of the leader, but it is judged that the ability of the players will be increased if the practical coaching ability and qualities are supported so that they can instill trust in the players and concentrate on the sport.

Second, among the transformational leadership factors of baseball leaders, intellectual stimulation and charisma were found to have positive effects on sports confidence(social support) factors. Accordingly, support the results of this study by arguing that the transformational leadership of the Taekwondo instructor has a very positive effect on the sports confidence and exercise satisfaction of the demonstrator[23].

Therefore, in order to stimulate sports confidence(social support) of baseball players, intellectual stimulation and charismatic factors of transformational leadership must be stimulated. The social support factor is when a person receives praise, trust, encouragement, etc. Accordingly, it is judged that if the coach sets goals and tasks so that the players can receive praise and encouragement, and conveys the belief to the baseball players that they can focus only on exercise, the athletes' confidence in sports will be greatly increased.

Third, among the transformational leadership factors of baseball leaders, intellectual stimulation and charisma factors were found to have positive effects on sports confidence(leadership) factors. It is judged that these results were converted into sports confidence when players perceived that they were learning from a competent leader and when their trust in the leader was strong.

Based on the results of this study, in order to strengthen sports confidence(leadership) through transformational leadership, the players should form a bond through numerous conversations so that they can trust the leader, and set goals for each player to stimulate will have to Then, by demonstrating practical skills during training, it is judged that if the players show an example to the players and continuously appeal to the coaching ability, the players will give trust to the coach and increase their sports confidence over time.

Fourth, among the transformational leadership factors of baseball leaders, the consideration factor was found to have a positive effect on the sports confidence(physical/mental preparation) factor. supports the results of this study by arguing that the transformational leadership(consideration) of wrestling coaches affects the attitude and confidence(physical/mental preparation) factors of athletes[24][25].

Therefore, based on the results of this study, we should try to give consideration to the players so that they can have confidence. The consideration factors of transformational leadership are factors that respect the opinions of the players, give the players the confidence to believe in themselves, and provide a haven where they can lean on the coach. These factors will give baseball players the confidence and environment to focus on training and playing, and improve their technical skills.

8. Results and Suggestions

This study investigated the effect of transformational leadership of baseball leaders on sports confidence. Amateur baseball, including professional baseball, is experiencing difficulties due to COVID-

19, which no one expected recently. At this point in time when anxiety is growing due to the issue of tournament cancellation and admission, we intend to provide practical basic data for expanding baseball participation and enhancing confidence through the leader's transformative leadership.

Accordingly, the population was selected from players participating in the tournament hosted by the Korea Baseball Softball Association for about three months from May to August 2022, and a questionnaire was distributed and a total of 231 copies were used for the final analysis. For data processing methods, frequency analysis, exploratory factor analysis, reliability analysis, correlation analysis, multiple, and simple regression analysis were performed using SPSS 21.0, and the following conclusions were drawn based on the results.

First, the charismatic factor of transformational leadership of baseball leaders was found to have a significant effect on sports confidence(proof of ability).

Second, the intellectual stimulation and charisma factors of transformational leadership of baseball leaders were found to have a significant effect on sports confidence(social support).

Third, the intellectual stimulation and charisma factors of transformational leadership of baseball leaders were found to have a significant effect on sports confidence(leadership).

Fourth, the consideration factors of the transformational leadership of baseball leaders were found to have a significant effect on sports confidence(physical/mental factors).

Based on the limitations of this study, I would like to suggest the following directions for future research.

First, this study is somewhat difficult to generalize because it was targeted to baseball players among sports. Therefore, it is judged that more diverse results will be obtained if the follow-up study is conducted with various sports players.

Second, since this study was conducted only with male baseball players, it is somewhat difficult to generalize. Therefore, in the follow-up study, it is judged that more diverse research results will appear if the difference in transformational leadership compared to female athletes is identified.

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10. Appendix

10.1. Authors contribution

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

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A Study on the Activation of Figure Skating for People with Disabilities

Sunghee Koh

Myongji University, Yongin, Republic of Korea

Abstract

Purpose: *This study aims to examine and suggest development directions to revitalize the process of figure skating with disability in Korea.*

Method: *In this study, literature analysis was conducted by investigating research data on figure skating for the people with disability in order to examine the process in Korea and suggest ways to revitalize it. In addition, data of sports organizations such as the Korea Paralympic committee and Special Olympics Korea were collected to find out the need for sports for the people with disability, the characteristics and value of skating, and to find ways to revitalize figure skating.*

Results: *This study grasped the current status and collected and analyzed data to cope with the changing environment of sports for the people with disability and the changes occurring in the field of figure skating for the people with disability. The conclusions and suggestions are as follows.*

First, as a representative organization of winter sports for people with disability, figure skating can be included in the national winter competition for people with disability, which can play a role in the increase of the ice skating population with the Special Olympic Korea Committee.

Second, various positive effects can be physically and mentally through the continuous participation of disabled people in figure skating, and balanced development should be established by establishing a linkage system from sports people with disability to professional sports for the purpose of improving and developing performance. When planning projects related to professional sports, sports for all, and school sports for people with disabilities, the purpose of establishing pleasant experiences, social skills, and health improvement through physical activities, and fostering professional athletes and developing performance. Third, there should be many stadiums where athletes can officially practice. Dongcheon Ice Rink was established for the first time for the people with disability, but it is regrettable that there are other cases where training for the people with disability on the ice rink is restricted for safety reasons.

Conclusion: *Based on the results of the study, Skating events for the people with disability are divided into short track and figure skating, and are held annually at the National Winter Games for the people with disability and the Special Olympics Winter Games. As a result, it is considered meaningful to find various ways to revitalize figure skating for the people with disability so that they can induce more participation than before COVID-19. In the future, if we create an environment where people with disability can train freely, more figure skaters will be created. Finally, in the follow-up study, it is considered that there is a need for expanded research targeting experts in the special sports field, leaders by event, and participants.*

Keywords: ***Figure Skating, Special Olympic, People with Disability, Intellectual Disability, Ice Rink***

1. Introduction

The ice skating include speed skating, short track and figure skating has attracted a lot of public

attention. Especially Figure skating is becoming popular as a sports for life because it can make body posture correct and affect not only balance, sensory organization, and exercise but also self-efficacy and social development[1][2]. Also, figure skating develops a sense of balance and vestibularity physically for people with physical disabilities and improve social skills and cognitive skills for people with developmental disabilities[3][4][5]. In addition, sports activities can have positive effects physically, socially, and psychologically for people with physical and mental difficulties[6][7][8][9]. And For this reason, figure skating is a profitable sport for disabled people[1]. Korean skater participate in the Special Olympics Korea Winter Games every year and participate in the quadrennial Special Winter Olympics as a national team member. Various positive effects can be expected physically and mentally through such continuous participation in figure skating for the people with disability. The process of connecting from sports for all for the people with disability to professional sports the people with disability for the purpose of improving and developing their performance may be planned. So far, studies have shown that participation in sports activities improves social skills to lead a self-reliant life for the intellectually disability[10][11][12], and that participation in competitions is related to the impact of participation in sports for the people with disability[13].

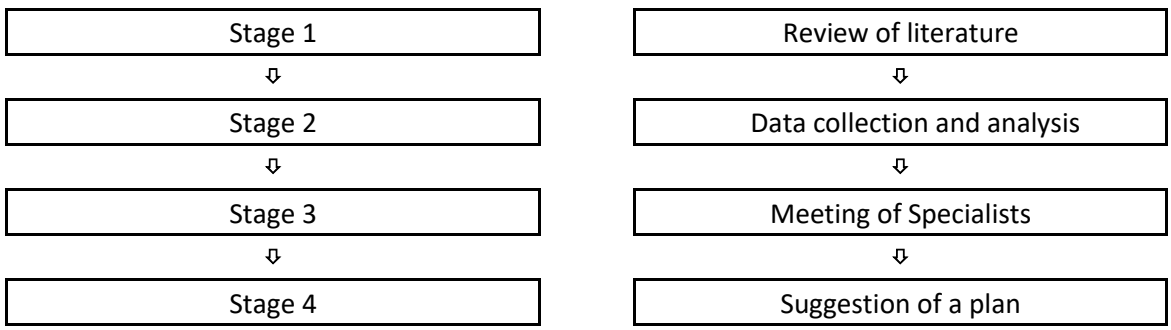
Recent studies on the disabled have shown a tendency to be very interested in well-being, happiness, and quality of life of the disabled, which are physically, emotionally, and socially constrained. An important key to this study is what is needed and how can be improved for the well-being of the disabled, so previous studies have dealt with the importance of exploring and verifying various variables for the well-being of the people with disability. In particular, studies related to physical education report participation in sports as an important factor in relation to the well-being of the disabled. Most of these results are that many of the effects of participating in sports activities have a positive effect on the people with disability[14][15][16][17]. However, there is no research to participate in figure skating for the people with disability, so research to find various ways is needed.

This study aims to examine and suggest development directions to revitalize the process of figure skating for people with disability in Korea.

2. Research Method

In this study, literature analysis was conducted by investigating research data on figure skating for the People with disability in order to examine the process of figure skating in Korea and suggest ways to revitalize it. In addition, the data of sports organizations such as the Korea Paralympic committee and Special Olympics Korea were collected to find out the need for sports , the characteristics and value of skating, and to find ways to revitalize figure skating. The researchers have been conducting research related to figure skating for the people with disability and reviewed 30 academic papers for this study. For the authenticity of the data, it was revised and supplemented through a review with two professors majoring in special sports and one figure skating leader for people with disability. The research procedure is as follows <Figure 1>.

Figure 1. The research procedure.



3. The Need for the Sports for the People with Disability

3.1. People with disability

After participating in the second Tel Aviv Paralympic Games in 1968, the national competitiveness of disabled sports began to develop a lot and brought about a change in the perception of the people with disability in Korea. The government's policy orientation played a major role in promoting Korea's sports for the disabled to the international community. Sports for the disabled were handled by the Ministry of Health and Welfare and the Korea Welfare Association for the Disabled until 2005, and at that time, sports policies for the people with disability focused on welfare rather than sports. In addition, the establishment of the Korea Paralympic Committee and the transfer of work to the Ministry of Culture and Tourism laid the foundation for strengthening the meaning of sports and sports[18]. Sports activities for the people with disability can contribute to social integration by improving the quality of life and enhancing the psychological unity and autonomy of the people with disability[19][20]. In addition, the possibility of leading a healthy life and happiness for individuals with disabilities increases[16].

Sports for All is a sports activity that can be easily done in everyday life and is an beneficial living culture for the use of leisure time, health, maintenance, and formation of new human relationships. Sports for all can be said to be a physical activity that promotes individual physical, mental, and social development and improves a sense of community with others by actively and continuously participating in sports activities throughout the life. Therefore, the indicator of daily sports is becoming one of the measures to evaluate the welfare state[21].

Stuart and Kenneth(1990) reported that regular physical activity expresses playful elements in individuals with disabilities, which increases life satisfaction[22][23]. And participation in sports for the disabled can play a very important role in the fact that it can be expanded to reduce medical expenses[16].

Until now, disabled people have not had enough opportunities to participate in daily sports due to lack of public awareness and social indifference. In the past, the disabled, who were underprivileged, had to be satisfied with their basic lives, but as society stabilizes, interest in equal educational opportunities and social participation opportunities increases, interest in physical and mental health through exercise is increasing. Accordingly, the demand for the promotion of sports for the disabled is gradually expanding[21].

Now, sports for the disabled have emerged as an area of importance for the needs of the times along with the non-disabled in terms of not only individual health management, but also social participation, satisfaction of needs, and improvement of welfare standards. For the disabled, the value of sports obtained through physical activities is important not only for non-disabled people but also for participants in sports for the disabled in terms of overcoming obstacles and integrating them as social workers[24][25][26].

In this way, the participation of club members in the competition is seen to play a major role in inducing the positive impact of daily sports, such as the research results shown in the disabled sports awareness and exercise sentiment[27][28][29]. In particular, with the emergence of such competitions, it is thought that the base of sports for all will expand and participation in sports for all will eventually lead to the participation of professional sports.

Professional sports refers to the promotion of health through physical education and the creation of various conditions in which one can demonstrate one's skills through sports beyond the limits of human ability[30]. It covers a wide range of areas, including hosting various domestic competitions, selecting and systematically and scientifically fostering and managing outstanding athletes, training facilities for athletes, and operating and supporting sports organizations and the Korea Paralympic Committee[21].

Professional sports for the disabled is an important part of sports in Korea, where the Korean Sports Association for the Disabled, sports organizations, and sports organizations by type of disability cooperate with each other organically with the support of the government and local governments. It also plays a pivotal role in improving the credibility of the competition by enhancing the image and status

of the country, promoting national unity and pride, leading the revitalization of sports for the disabled, and holding international competitions. Summer events include goal ball, golf, basketball, billiards, dance sports, wheelchair rugby, ron ball, volley ball, badminton, boccia, bowling, shooting, cycling, swimming, horseback riding, archery, judo, track and field, soccer, table tennis, taekwondo, wheelchair fencing, and winter sports.

3.2. The value of figure skating for the people with disability

Figure skating is reported to have a positive effect on the development of balance, sensory tissue, and exercise, making disabled people's body posture correct. In addition, the participation of skating can affect the self-efficacy and social development of people with disability[29]. For people with physical disabilities who have difficulty moving due to physical discomfort, figure skating can help develop a sense of balance and vestibularity physically, and improve sociality and cognitive skills for people with developmental disabilities[3][4][5].

It is known that sports activities can have positive effects physically, socially, and psychologically for people with physical and mental difficulties. These studies show the positive effect of figure skating for people with disability[3][4][28][31].

3.3. Korea Paralympic winter game

Korea Paralympic winter game, which started as the first one in 1981, has been held 41 times until 2021, and 42 times are scheduled for 2022. In 2005, the Ministry of Culture, Sports and Tourism established a sports team for the people with disability and the Korea Sports Council for the people with disability , and the government-led support for professional sports for the people with disability naturally increased, laying the foundation for the development of sports for the people with disability[21].

Korea Paralympic game marked the World Year, which was enacted by the UN in 1981, and Korea Paralympic winter game was finally held. Prior to that, there were several competitions for each disability, including the National Free Youth Sports Festival hosted by the Establishment Center, the Korea Paralympic game hosted by the Korea Veterans Association, and the National Intellectual Disability Football Competition, but the first comprehensive sports event involving all people with disability .

The purpose of the competition is first to improve the performance of athletes through sports activities, second to discover excellent new players and foster social adaptation skills through national sports, third to create a social atmosphere for them and the general public, and fourth to enhance public understanding of the people with disability. In addition, the basic direction of the competition is first to minimize the burden of using national sports facilities and equipment, second, to provide opportunities to expand convenience facilities for the disabled, and third, to induce autonomous participation of citizens of the venue.

Hosted by the Korea Paralympic Committee, Korea Paralympic winter game will be held under the auspices of the Ministry of Culture, Sports and Tourism and the Korea Sports Promotion Foundation. Korea Paralympic winter game may be attended by the people with disability , the visual impairment, the intellectual(developmental) disability, and the hearing impaired. There are seven events, including alpine skiing, snowboarding, cross-country skiing, biathlon, ice hockey, curling, and ice skating, but not figure skating. The categories are divided into the Elite Division and the Club Division. It is divided into six events: alpine skiing(physical disability, blind, deaf), snowboarding(physical disability, deaf), cross-country skiing(physical disability, blind, deaf), biathlon(physical disability, blind), ice hockey(physical disability, deaf.

It is divided into three categories: Alpine skiing[intellectual(developmental) disability], cross-country skiing[intellectual(developmental) disability], and ice skating(short-track)[physical disability, hearing, and intellectual(developmental) disability]. The following is the current status of participation in the Korea Paralympic winter game <Table 1>.

Table 1. The participation status of Korea paralympic winter game[32].

Round	Period	Place	Official			Number	Participant	
			Athlete	Official	Total			
17	20.2.11~2.14	Gangwon-do	7	459	520	979	Physical, intellectual(developmental) disability, hearing, visual impairment	Korea paralympic committee
16	19.2.12~2.15	Gangwon-do, Seoul	7	394	490	884	Physical, intellectual(developmental) disability, hearing, visual impairment	
14	17.2.7~2.10	Gangwon-do	7	421	459	880	Person with amputation, intellectual, hearing, visual impairment	
13	16.2.16~2.19	Gangwon-do	6/1	405	413	818	Person with spinal cord injury, amputation, with cerebral palsy, hearing, visual impairment, intellectual disability	
12	15.02.09~02.12	Gangwon-do, Seoul	6	376	378	754	Person with spinal cord injury, amputation, cerebral palsy, hearing, visual impairment, intellectual disability	
11	14.2.11~2.14	Gangwon-do	5	344	385	729	Person with spinal cord injury, amputation, cerebral palsy, hearing, visual impairment, intellectual disability	
10	13.2.25~2.28	Gangwon-do	5	372	366	738	Person with, amputation, cerebral palsy, hearing, visual impairment intellectual disability	
9	12.2.28~3.02	Jeolla-do	5	365	366	731	Person with spinal cord injury, amputation, cerebral palsy, hearing, visual impairment, intellectual disability	
8	11.2.15~2.18	Gangwon-do	5	338	347	685	Person with spinal cord injury, amputation, with cerebral palsy, hearing, visual impairment, intellectual disability	
7	10.1.26~1.29	Gangwon-do, Seoul	5	330	330	660	Person with spinal cord injury, amputation, with cerebral palsy, hearing, visual impairment, intellectual disability	
6	09.2.10~2.13	Gangwon-do	5	304	303	607	Person with spinal cord injury, amputation, with cerebral palsy, hearing, visual impairment, intellectual disability	
5	08.2.19~2.22	Gangwon-do	5	215	231	446	Person with spinal cord injury, amputation, with cerebral palsy, hearing, visual impairment, intellectual disability	
4	07.2.21~2.24	Gangwon-do	4/1	117	107	224	Person with spinal cord injury, amputation, with cerebral palsy, hearing, visual impairment, intellectual disability	
3	06.2.22~2.24	Gangwon-do	3/1	102	107	209	Person with spinal cord injury, amputation, with cerebral palsy, hearing, visual impairment, intellectual disability	
2	05.2.17~2.18	Gangwon-do	3	80	70	150	Person with spinal cord injury, amputation, with cerebral palsy, hearing, visual Impairment, intellectual disability	Korea welfare promotion association for the disabled
1	04.2.23~2.25	Gangwon-do	4	100	50	150	Person with spinal cord injury, amputation, with cerebral palsy, hearing, visual impairment, intellectual disability	

3.4. Special olympic winter game

With the establishment of the Korea Paralympic committee in 2005, a turning point in the sports environment for the disabled in Korea, it joined as a member organization by type of disability. In 2008, it was newly established as the Korea Special Olympic Committee, and after continuing its activities at

home and abroad, it successfully hosted and hosted the 2013 Pyeongchang Special Olympics[33].

The Special Olympics Korea National Winter Competition first began in 2012 and has now been held for the fourth time. Through the hosting of these national winter competitions, it provides opportunities for people with developmental disabilities across the country to participate in winter events, and is used as a selection material for the World Winter Games through the results of the competition. Alpine skiing, snowboarding, cross-country skiing, snowshoeing, short track, speed skating, and figure skating are in operation for a total of six events, and have been held once in 2012, twice in 2016, three times in 2019, and four times in 2022 <Table 2>.

Table 2. The participation status of special olympic Korea national winter competition.

Round	Year	Number	Place
1	2012 special olympic Korea national winter competition	313	Gangwon- do
2	2016 special olympic Korea national winter competition	520	Gangwon- do
3	2019 special olympic Korea national winter competition	360	Gangwon- do, Seoul
4	2022 special olympic Korea national winter competition	77	Gyeonggi- do

Through an agreement with the International Olympic Committee(IOC), the Special Olympics are hosting a world competition where the name 'Olympics' can be officially used along with the Olympics and Paralympics. Starting with the first competition(Chicago, USA) in 1968, the summer and winter competitions are held alternately every two years. Figure skaters are practicing and making efforts for the Special Olympic Winter Games, which are held once every four years, but they need the annual figure skating competition. South Korea successfully hosted the Special Olympics Winter Games in Pyeongchang in 2013 and 11 figure skaters participated in the event, resulting in good results. As of 2022, there are only six skaters and more are needed.

4. Conclusion and Suggestions

This study grasped the current status and collected and analyzed data to cope with the changing environment of sports for the disabled and the changes occurring in the field of figure skating for the disabled. The conclusions and suggestions are as follows. First, as a representative organization of winter sports for the disabled, figure skating can be included in the national winter competition for the disabled, which can play a role in the increase of the ice skating population with the Special Olympic Korea Committee. Figure skating has a special Olympic Winter Games where people with developmental disabilities can participate, and if figure skating is also held at the National Sports Festival for the Disabled, the number of figure skaters could increase further. Skating events for the disabled are divided into short track and figure skating, and are held annually at the National Winter Games for the people with disability and the Special Olympics Winter Games.

Second, various positive effects can be physically and mentally through the continuous participation of people with disability in figure skating, and balanced development should be established by establishing a linkage system from sports people with disability to professional sports for the purpose of improving and developing performance. When planning projects related to professional sports, sports for all, and school sports for persons with disabilities, the purpose of establishing pleasant experiences, social skills, and health improvement through physical activities, and fostering professional athletes and developing performance. In 2022, 51 out of 481 winter athletes specialized in ice skating for the people with disability. In the past two years, many athletes have quit their activities as skating activities and skating events have been canceled due to the COVID-19 situation. As a result, it is considered meaningful to find various ways to revitalize figure skating for the people with disability so that they

can induce more participation than before COVID-19.

Third, there should be many ice rink for people with disability where athletes can officially practice. Dongcheon Ice Rink was established for the first time for people with disability, but it is regrettable that there are other cases where training for the people with disability on the ice rink is restricted for safety reasons. In the future, if we create an environment where people with disability can train freely, more figure skaters will be created.

Finally, in the follow-up study, it is considered that there is a need for expanded research targeting experts in the special sports field, leaders by event, and participants.

5. References

5.1. Journal articles

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6. Appendix

6.1. Authors contribution

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

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Asymmetry of Motor Symptoms and Neuronal Degeneration in Parkinson's Disease: A Brief Scoping Review

Miso Sophia Park[1]
Daejeon Korean Medicine Hospital of Daejeon University, Daejeon, Republic of Korea
Sangsoo Park[2]
Daejeon Korean Medicine Hospital of Daejeon University, Daejeon, Republic of Korea
Wangjung Hur[3]
Daejeon University, Daejeon, Republic of Korea
Horyong Yoo[4*]
Daejeon University, Daejeon, Republic of Korea

Abstract

Purpose: *Parkinson's disease(PD), the fastest-growing neurodegenerative disease, is a movement disorder that manifests unilaterally. Clinical studies, neuroimaging studies, and longitudinal studies all indicate that the clinical features and progression of PD are asymmetric. The asymmetry of PD is thought to be an important clue in understanding the disease's pathophysiology. The purpose of this study is to see how the concept of PD asymmetry evolved over time, to identify the different types of asymmetry that can be seen in PD, and to understand the clinical implications of the different types of asymmetry in PD.*

Method: *The following were our review questions. (1)How has PD asymmetry research evolved over time? (2)What types of asymmetry can be seen in PD? (3)What are the clinical implications of the various types of asymmetry seen in PD? To investigate such questions, we used the keywords "Parkinson" and("symmetry" or "asymmetry") in PubMed. Articles about idiopathic Parkinson's disease(iPD) patients with a clear concept of symmetry or asymmetry that were peer-reviewed and written in English were included. The type of article, participants, three main keywords, and the type of symmetry concepts in the study were extracted. We excluded studies that did not include patients with idiopathic PD or that did not have a clear concept of symmetry.*

Results: *Based on a PubMed search, the number of published articles on iPD and symmetry gradually increased beginning in the 1980s. Of the 563 articles that were initially searched, 333 articles were related to both iPD and symmetry or asymmetry concepts. There were 171 articles on nervous system asymmetry, 133 on motor symptoms and gait asymmetry, 24 on disease presentation asymmetry, and 5 on anatomical or histological structures asymmetry. The majority(n = 70) of the 171 studies on nervous system asymmetry dealt with lateralization of brain function and the resulting asymmetries in motor symptoms and disease manifestations in iPD patients.*

Conclusion: *Asymmetry in iPD patients has mainly been studied based on nervous system asymmetry, motor symptoms, and overall disease presentation. Other types of asymmetry, such as asymmetry in anatomical and histological structures, have been studied in some studies. Asymmetry in iPD is not only an inherent feature of the disease; it also appears to be related to the disease's various symptoms and signs. As a result, more research is needed to better understand the pathophysiology of iPD and to provide iPD patients with a prognosis and advice for disease management.*

Keywords: ***Parkinson's Disease, Neurodegenerative Disease, Motor Symptoms, Asymmetry, Scoping Review***

1. Introduction

Parkinson's disease(PD) is the fastest-growing neurodegenerative disease[1], and its prevalence is rising especially in aging countries. According to a study based on sample cohort data from the Korean National Health Insurance Corporation, the prevalence of PD in Korea increased from 41.4 in 2004 to 142.5 in 2013 per 100,000 people[2]. The gender and age-standardized

prevalence of the disease also increased from 115.9 in 2010 to 139.8 in 2015 per 100,000 people[3]. As the global population ages, the prevalence of degenerative brain diseases such as PD will rise, necessitating the development of appropriate countermeasures.

PD is a movement disorder with clinical features of bradykinesia, postural instability, resting tremor, and rigidity due to dopaminergic neurodegeneration in the midbrain substantia nigra. These motor symptoms of PD typically begin unilaterally and later become bilateral as the disease progress[4][5]. Neuroimaging studies, such as diffusion magnetic resonance imaging(MRI) and positron emission tomography/computed tomography(PET/CT) studies, also suggest that dopaminergic neurodegeneration in the substantia nigra begins unilaterally in PD[6][7]. Furthermore, a longitudinal study in PD patients using high-density electroencephalography(HD-EEG) found asymmetry in the disconnected brain networks, which was associated with the lateralization of motor symptoms[8].

Unlike other parkinsonian syndromes such as multiple system atrophy, progressive supranuclear palsy, and diffuse Lewy body disease, unilateral symptoms are so prominent in PD that they serve as a clinical parameter to differentiate it from other disorders. Although the specific cause of the asymmetry of PD has not been elucidated, researchers believe that it will be an important clue in understanding the pathophysiology of the disease[9]. Therefore, in this brief scoping review, the authors aimed to identify the areas studied for PD asymmetry and organize specific asymmetry types. We believe that the findings of this review will help us better understand the pathophysiology of PD.

2. Methods

2.1. Review questions

i. How has research on PD asymmetry developed over time?

ii. What kinds of asymmetry can be seen in PD?

iii. What are the clinical implications of the different types of asymmetry seen in PD?

2.2. Study selection

In this review, we included studies involving patients with idiopathic Parkinson's disease(iPD). Studies involving other parkinsonian syndromes or neurodegenerative disorders were excluded from the review. We used the keywords "Parkinson" and("symmetry" or "asymmetry") to search the PubMed database. The article titles and abstracts were screened. Peer-reviewed, English-written articles about iPD patients with a clear concept of symmetry or asymmetry were included. The type of article, participants, three key concepts, and the type of symmetry concepts in the study were extracted and charted using Microsoft Excel(Microsoft, Redmond, WA, USA). During the process, studies that did not include iPD patients or did not have a clear implication of symmetry or asymmetry concepts were excluded.

2.3. Data analysis and presentation

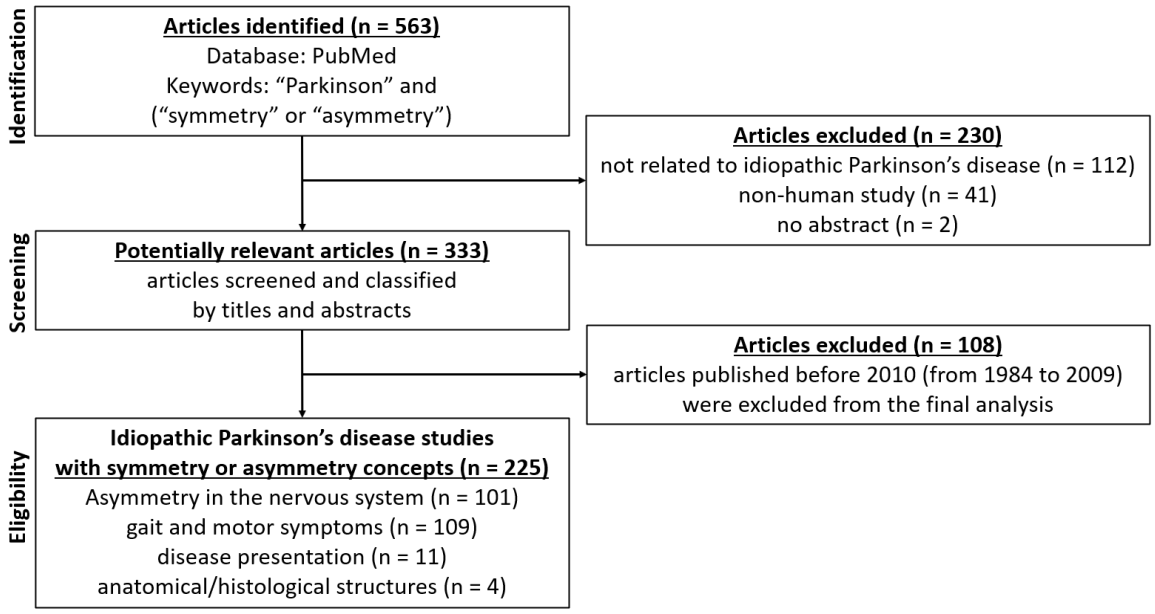
The quality of the included articles will not be evaluated, in accordance with scoping review standards. Instead, we will provide an overview of current asymmetry concepts seen in iPD patients. We will include all eligible literature covering the entire period to identify the research trends. Following that, we will include recent articles from 2010 to the present to analyze each concept in detail. However, if significant concepts were only discovered in the literature prior to 2010, we will include them in the analysis as well.

3. Results

3.1. Parkinson's disease asymmetry research trends

From 563 initially searched articles, n = 333 articles were related to both iPD and symmetry or asymmetry concepts. Among those, 171 articles dealt with nervous system asymmetry, 133 with motor symptoms and gait asymmetry, 24 with disease presentation asymmetry, and 5 with anatomical or histological structures asymmetry. There were 317 original articles and 16 review articles. Among the 230 excluded articles, 112 were excluded because they were not directly related to iPD, 75 were excluded because they lacked a clear concept of symmetry or asymmetry, 41 were excluded because they were in-vivo or in-vitro studies on animals and cells, and 2 were excluded because they lacked an abstract The detailed study selection process is shown in <Figure 1>.

Figure 1. Flow chart of the study selection process.



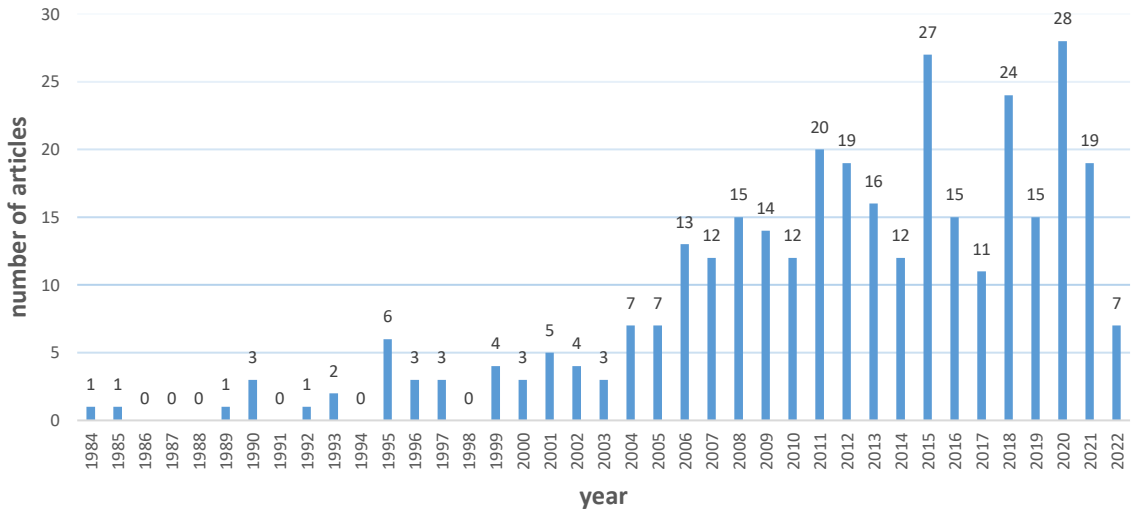
The number of published articles on iPD and symmetry, based on a PubMed search, gradually increased beginning in the 1980s, as shown in <Figure 2>. 2 articles from the 1980s dealt with nervous system asymmetry while 1 dealt with motor symptom asymmetry. 22 articles published in the 1990s dealt primarily(n = 17) with nervous system asymmetry. During the 1990s, only three articles dealt with asymmetry in motor symptoms, one with disease presentation-related asymmetry and one with structural asymmetry. In the 2000s, research on gait asymmetry began to emerge(8 out of 83 articles). During the 2000s, 51 studies reported nervous system asymmetry, 12 studies reported motor symptoms asymmetry, and 12 studies reported disease presentation asymmetry. Finally, there were 225 studies from 2010 to the present. Among the articles, 101 dealt with nervous system asymmetry, 76 with gait asymmetry, 33 with motor symptoms asymmetry, 11 with disease presentation asymmetry, and 4 with structural asymmetry. We will only include articles published after 2010 for further analysis. However, if important concepts were only found in the literature prior to 2010, then we will additionally include them in the analysis as well.

3.2. Asymmetry in the nervous system

The most studied area of asymmetry in iPD patients, according to a PubMed search, was asymmetry in the nervous system. Among the 101 studies on the topic, the majority(n = 48)

dealt with lateralization of brain function and resulting differences in disease manifestations in iPD patients. Neuronal damage typically begins asymmetrically in iPD, and corresponding parkinsonian symptoms appear first on the side of the body opposite the neuronal damage.

Figure 2. The number of articles published each year on idiopathic Parkinson's disease and asymmetry research, based on a PubMed search.



Many studies have reported asymmetric neurodegeneration in brain regions such as the nigrostriatal system[9][10][11][12] in iPD patients. Asymmetric nigrostriatal degeneration in the brain results in the onset of motor symptoms on the contralateral side of the body[9][10]. According to magnetic resonance imaging(MRI) studies, substantia nigra pars compacta has lateral asymmetry and asymmetrical microstructural degeneration[9][13]. According to neuroimaging studies using single-photon emission computed tomography(SPECT) and positron emission tomography(PET), neurodegeneration and dopamine receptor changes in the substantia nigra and striatum also occur asymmetrically[14][15]. Furthermore, a transcranial sonography study in iPD patients revealed asymmetry in substantia nigra hyperechogenicity[16].

Asymmetry in symptoms and neurodegeneration is prominent in iPD, but the exact cause of this phenomenon is unknown. Among the 48 studies, some(n = 7) attempted to link handedness and lateralization of iPD symptoms. Some studies suggest that there is a link between handedness and the side of symptom onset. According to a systematic review and meta-analysis by van der Hoorn et al., there are more cases where the dominant hand and the side of the initial motor symptom are the same than the other way around, with an overall odds ratio of 2.13[17]. A similar pattern was observed in a more recent study between the dominant hand's side and the side of initial motor onset. The study also displayed that according to neuromelanin-sensitive imaging, neurodegeneration was more pronounced on the contralateral side of handedness[18]. Another study using dopamine transporter(DAT)-SPECT and transcranial sonography revealed a similar pattern of asymmetrical neurodegeneration to the contralateral side of hand dominance[19]. There is evidence, however, that increased physical activity on the dominant side of handedness protects the contralateral motor cortex[20]. Such compensation in the cerebral cortex may explain some of the inconsistency in the proportion between the side of initial motor onset and contralateral neurodegeneration observed in Prasad et al.'s study[18].

Neurodegeneration asymmetry in iPD can occur in either the right or left hemisphere of the brain. Because the functions of the left and right hemispheres of the brain are not identical, researchers have attempted to compare the symptoms of patients with iPD, with the left onset of motor symptomsLPD), and with the right onset of motor symptoms(RPD). There were 20 studies that tried to compare LPD and RPD patients in terms of cognitive function and perception. In general, LPD patients had worse visuospatial performance[21], poorer spatial

memory[22], rightward bias and pseudo-neglect on the left side[23], impaired feedback-based associative learning[24], faster cognitive decline[25], problems with spatial attention and visuospatial orienting[26], decreased access to religious cognition[27], reduced linguistic complexity such as producing fewer verbs and function words[28], and increased harm avoidance[29]. On the other hand, RPD patients had impaired estimates of body-scaled aperture width[30], leftward bias and pseudo-neglect on the right side[23], more pronounced verbal memory problems[26], and decreased novelty seeking[29], but better prognosis in terms of cognition[25].

There have also been attempts to characterize the LPD and RPD patients' neuropsychiatric characteristics. However, there are contradicting results as some studies suggest that a higher prevalence of hypomania and conversion profile could be found in LPD patients[31], as well as nocturnal hallucinations and daytime sleepiness[32], while other studies suggest that a higher prevalence of hallucinations and sleep behavior disorder are more frequent in RPD patients[33], and a higher degree of Parkinson-related psychosis[34]. It might be that those neuropsychiatric symptoms are related to Lewy-body pathophysiology rather than lateralization of PD manifestation[35], and the manifestation of Lewy-body pathology may not be as lateralized as that in iPD[36]. Meanwhile, there were some other interesting studies that suggest that LPD may be related to some obsessive-compulsive symptoms[37], and alteration in detecting and processing emotional salience in voices such as disgust, anger, and happiness[38][39].

Furthermore, many studies(n=41) indicate that there is marked asymmetry in neurodegeneration in iPD patients, which can be used as a tool for differential diagnosis of vascular parkinsonism[40][41][42], and Parkinsonism plus syndromes such as multiple system atrophy(MSA), dementia with Lewy bodies(LBD), and progressive nuclear palsy(PSP)[36][43]. However, unlike other non-idiopathic parkinsonian syndromes, corticobasal degeneration(CBD) patients have neurodegeneration asymmetry similar to iPD[44]. The rest(n = 12) of the studies suggest that there are asymmetries in visually guided saccades[45], blinking reflex[46], and optokinetic nystagmus[47]. Besides neurodegeneration, there were also accompanying changes in cerebral blood flow and hemodynamics[48], brain metabolic network[49], and neural activities[50][51] which were all less or more asymmetric.

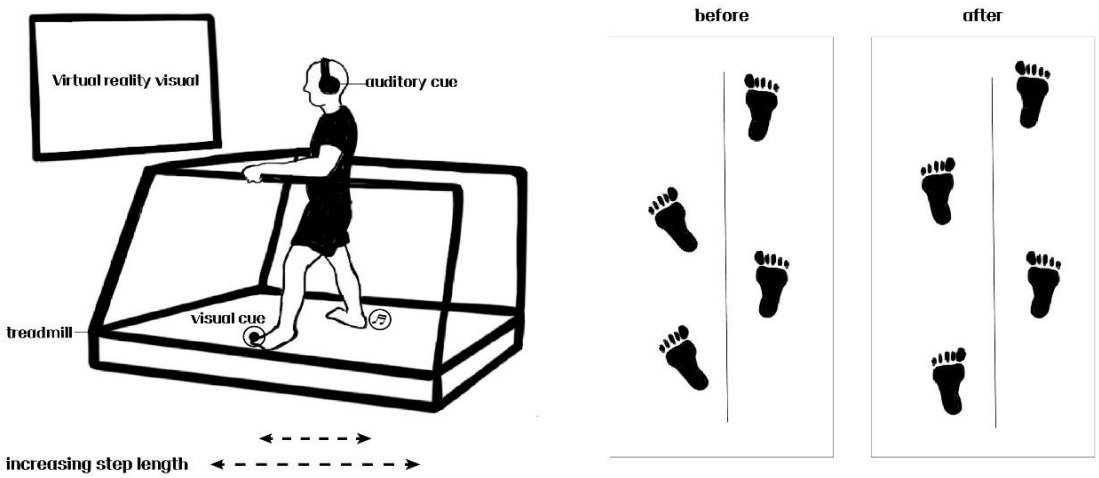
3.3. Asymmetry in the motor symptoms and gait

Asymmetry in motor symptoms and gait in iPD patients was the second most studied area after the nervous system. Among the 109 studies, 76 were related to gait and 33 to motor symptom asymmetry. Gait parameters, such as step time and length[52][53][54][55], arm swing asymmetry, and reduced interlimb coordination[56][57] are all characteristics of iPD patients[58][59][60]. Especially, arm swing asymmetry is prominent from the early stage of iPD and it is suggested as one of the biomarkers for early detection of iPD[58][59]. Another characteristic of iPD is the freezing of gait(FOG). Studies suggest a possible relationship between FOG, turn bias, and gait asymmetry in iPD patients[57][61]. Gait is found to be less rhythmic and more asymmetric in patients with FOG[62]. In addition to reduced rhythmicity, reduced step length is suggested to be another factor that affects FOG[57].

Meanwhile, studies suggest that cueing and increasing step length can assist iPD patients in restoring gait symmetry. Brodie et al. found that auditory cues tailored to each patient's habitual gait symmetry and cadence could improve gait steadiness[63]. Virtual reality visual cueing combined with treadmill training could also improve step length and gait symmetry[64]. Another study discovered that swing time asymmetry worsens when stride length is reduced, so increasing stride length during gait training may improve gait symmetry[65]. These factors can be used to improve gait symmetry in iPD patients during rehabilitation training <Figure 3>.

Motor symptoms such as tremor[66][67][68], rigidity[69][70], bradykinesia[70], and posture instability[71][72] were all found to be asymmetric in iPD. Asymmetry in tremors in iPD can be

Figure 3. Visual and auditory cueing, as well as increasing step length, may help patients with idiopathic Parkinson's disease regain gait symmetry.



used as a tool for differential diagnosis against essential tremor(ET) patients. In parkinsonian tremors, waveform, as well as tremor frequency and frequency dispersion were more asymmetric compared to essential tremors[66][67][68]. Whether increased postural asymmetry increases fall risk in iPD patients is controversial[71][72]. It can be noted that in general, asymmetry of motor symptoms begins unilaterally and progresses bilaterally in many cases of iPD, and posture asymmetry may appear more pronounced in some early-stage patients. Meanwhile, a specific type of posture abnormality in iPD patients called Pisa syndrome appears in the late stage of disease progression and is considered to be related to verticality misperception and basal ganglia output asymmetry[73][74].

3.4. Asymmetry in the general disease presentation

As previously stated, in many cases, the symptoms and signs of iPD begin unilaterally. Although some patients have abnormal asymmetrical features such as a different side of disease onset and progression, a different source of resting and action tremor, different rates of disease progression on different sides, and less pronounced tremor as the disease progresses[75], the majority of patients have unilateral disease onset, and the laterality may decrease but can also persist for the most part throughout the disease course[76]. On the other hand, atypical parkinsonism often manifests bilaterally from the start and then progresses rapidly[77]. Symmetrical disease presentation can be used to differentiate iPD patients from other types of parkinsonism, but it can also be used to predict PD patient survival. In iPD patients, symmetry in disease presentation was a sign of poor prognosis and survival, as suggested by a long-term follow-up study[78].

3.5. Asymmetry in the anatomical structure

Lastly, there were 4 articles that dealt with anatomical or histological asymmetry in iPD patients. Baek et al. recently suggested interocular asymmetry of retinal thickness in iPD patients and there was a correlation between temporal macular retinal thickness asymmetry and motor symptom laterality[79]. There are dopamine neurons in the retina and there was a strong inverse correlation between the peripapillary retinal nerve fiber layer(RNFL) thickness and the PD severity, measured by Unified Parkinson's Disease Rating Scale(UPDRS)[80]. Other studies dealt with asymmetry in muscles such as paraspinal muscles[81], gastrocnemius muscles, and tibialis anterior muscles[82]. In addition, one study suggested that there are occlusal contact asymmetry and a high prevalence of temporomandibular disorder[83], as well as asymmetry in the foveal pit in iPD patients[84].

4. Conclusion

PD, the fastest-growing neurodegenerative disease, is a movement disorder with unilateral onset. Although the asymmetry of iPD is thought to be an important clue in understanding the disease's pathophysiology, the cause of such asymmetry is unknown. To better understand the characteristics and types of asymmetry in iPD, we conducted a PubMed search and classified the studies based on the different types of asymmetries. Asymmetry in iPD patients has primarily been studied in terms of asymmetry in the nervous system, gait, motor symptoms, and disease presentation. Visual and auditory cueing, as well as increasing stride length, could help patients with iPD improve their symmetry during rehabilitation training. Other types of asymmetry such as asymmetry in anatomical and histological structures were also investigated in some studies. The asymmetry in PD is not only an intrinsic feature of the disease, but it also appears to be related to various symptoms associated with the disease. As a result, more research is needed to better understand the pathophysiology of iPD and explain the prognosis to patients with iPD.

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6. Appendix

6.1. Author's contribution

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

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