116-0002
2-20-7 Arakawa Arakawaku Tokyo Japan

ISSN 2423-835X

International journal of martial arts

2021 6(2)

J-INSTITUTE

2021 6(2) 1-9 Submission: 2021/05/10, Peer review: 2021/05/20, Accepted: 2021/05/25, Published: 2021/06/30

International Journal of Martial Arts

Publisher: J-INSTITUTE
ISSN: 2423-835X

Website: www.j-institute.jp/martialarts/
Editor: martialarts@j-institute.jp

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dx.doi.org/10.22471/martialarts.2021.6.2.01

Exploring the Experiences of Chinese Wushu Majors in Their Career Transition to Korean TAEKWONDO Leaders

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Abstract

Purpose: *The purpose of this study was to apply a phenomenological approach, a qualitative research method, to explore the common experiences of Wushu majors in China in the process of giving up their movements and transitioning to Korean Taekwondo leaders.*

Method: *For the selection of participants in the study, 6 participants aged 27 to 30 years old with experience in Wushu with more than 10 years of experience in competition as a student athlete were selected as a purposive sampling method among nonprobability sampling. In the analysis process, through the analysis framework of Giorgi's 4th stage the analysis process is conducted to identify text content from a holistic perspective, segmentation of semantic units, transformation into academic language, and integrating the converted semantic units into a structure.*

Results: *The results of the study were divided into situational structured statements and general structured statements, and in the situational structured statement, 5 elements, 16 sub-elements, and a total of 54 semantic units were found. According to the data analysis, five major components were found in the meaning of a Chinese Wushu major's career transition to a Korean Taekwondo leader: a "hardened Wushu education system", a "lack of Wushu operation management system", "choice of Taekwondo as a popular job", and " "regret and desire of giving up on Wushu".*

Conclusion: *This study suggest in concrete and vivid language why Wushu majors, who represent Chinese culture and are loved by Chinese people, switch to Taekwondo leaders. It was possible to examine the reasons why Wushu majors drop out, and through this, it was possible to discover the intrinsic and external problems perceived by Wushu majors. In addition, it is said that the research is meaningful in that it has suggested proposal for the sustainable development of Wushu majors through the research results.*

[Keywords] ***Wushu, Taekwondo, Abandonment, Career Transition, Phenomenological Approach***

1. Introduction

Wushu, China, is a large area of Chinese intangible cultural heritage, and is a method of mind and body training that operates the energy of the human body by matching breathing, consciousness, and movement based on Chinese medicine. Wushu, which has been a long tradition, is a martial art that can be practiced by both men and women of all ages regardless of time and place, so training is being conducted in many countries, including Chinese.

At the "18th National Congress of the Communist Party of China" held in Beijing on November 8, 2012, the Chinese leadership proclaimed a national strategy to devote itself to building a socialist cultural power house[1]. This confirms that strengthening Chinese national culture to build a socialist cultural powerhouse is the way to secure China's international competitiveness, and that policies were established as the most important factors for the spread and competitiveness of Chinese culture along with the economy and military. Accordingly, the

Ministry of Culture of China recognized Wushu as a representative cultural heritage among many intangible cultural heritages, and selected 35 Wushu schools representing the region in a total of four times in 2016, 2008, 2011, and 2014[2].

Modern China's Wushu began with the official establishment of the China Wushu Association in September 1958 by the National Sports Council of China. The China Wushu Association has set a goal to expand Wushu's influence and increase the population of Wushu since 1990, and established the International Wushu Federation(IWUF) for international dissemination, making great efforts to establish Wushu as an Olympic sport. However, gymnastic difficulty-oriented movements, subjective scoring methods, and the loss of martial arts characteristics contributed to the failure of the official Olympic events, and the Chinese government is still making great efforts to enter the Olympics[3].

It has been 100 years since 1916 that Wushu was officially introduced into public education as Chinese school sports. However, according to the survey of previous studies, classes are not properly conducted in most elementary, middle and high schools at present, and it is understood that Wushu courses are being closed due to a lack of students at universities[4]. On the contrary, Taekwondo and karate, which are foreign martial arts, are known to be well-received by students, so not only schools but also society have failed to realize fundamental Wushu distribution and practice.

The modern society is also becoming globalized in the field of leisure activities through the development of the Internet and international cultural exchanges. Thus, the formation and creation of a different culture can be seen as an inevitable process in modern society[5][6]. The trend of changes in modern society can be seen that the trend of changes in the modern society is that many cases of Wushu majors changing their career paths as Taekwondo leaders have permeated the Korean Taekwondo culture in China. However, the reason for this has not yet been clarified, and it is presumed that there is a clear reason for the career change.

There are many theories behind this career change. In general, it is said that student athletes are in conflict due to various psychological pressures such as time management, career worries, environmental constraints, heavy pressures encountered in daily life, and influx of new cultures and adaptations[7][8][9]. Moreover, after the end of a career, he may experience increased anxiety about his skills and frustration in preparing for career choice, and psychological concerns are not reduced[10][11].

The purpose of this study was to apply a phenomenological approach, a qualitative research method, to explore the common experiences of Wushu majors in China in the process of giving up their movements and transitioning to Korean Taekwondo leaders. The phenomenological research method is a qualitative research method that provides clear implications for the experiences and perceptions of the research participants and can suggest future research directions[12][13]. Therefore, as a result of this study, it is possible to grasp the cause of abandonment of exercise held by Wushu leaders in vivid language, and to confirm the reason for the transition to a career path to Taekwondo. Furthermore, it will also serve as an opportunity to confirm Wushu's perceived demand for change in China.

2. Methods

2.1. Participant

For the selection of participants in the study, 6 participants aged 27 to 30 years old with experience in Wushu with more than 10 years of experience in competition as a student athlete were selected as a purposive sampling method among nonprobability sampling. The first four participants were selected, but two were added by the snowball sampling method[10] in the course of the study, and the final six participants were analyzed. In the phenomenological approach, participants should be selected as a sample of individuals who fit the research topic and can express their experiences well[14]. Therefore, through the first interview, six partici-

pants who reflect abundant information on this research topic and maintain an active attitude were selected as the final participants. The general characteristics of the participants were shown in <Table 1> below.

Table 1. General characteristics of study participants.

No	Division	Gender	Age	Player career	Current job
1	Participant1	male	30	13 years	Taekwondo instructor
2	Participant2	male	28	10 years	Taekwondo instructor
3	Participant3	male	27	13 years	Taekwondo director
4	Participant4	male	30	11 years	Taekwondo director
5	Participant5	male	29	13 years	Taekwondo instructor
6	Participant6	male	30	14 years	Taekwondo instructor

2.2. Collecting date

Research data were collected primarily through literature review, followed by theoretical extraction, and secondly through narrative observation and in-depth interviews. The interview was conducted through a video call because it was not possible to face the participant directly due to the Corona 19 situation, and an open semi-structured interview was taken. Prior to the interview, prior consent was prepared, and the interview time was conducted at least two times each, dedicating about 30 to 40 minutes depending on the participant. The contents of the open-ended question are shown in <Table 2> below.

Table 2. Open-ended question content.

No	Question content
1	Research participant characteristics questions (gender, age, player experience, current occupation, etc.)
2	What motivated you to start wushu as a major?
3	What was the participant's past student experience?
4	What motivated you to quit wushu and choose a career as a taekwondo instructor?
5	What are your downsides as a wushu leader in China?
6	What are the advantages of becoming a Korean taekwondo leader in China?
7	As a wushu major, do you have any suggestions for the development of wushu leaders?

2.3. Analysis process

In the analysis process, through the analysis framework of Giorgi's 4th stage, the analysis process is conducted to identify text content from a holistic perspective, segmentation of semantic units, transformation into academic language, and integrating the converted semantic units into a structure. Giorgi's research method is characterized by integrating the partici-

pant's experiences into general and structural statements. In addition, The focus is on extracting empirical and objective materials in the form of interviews on topics that become phenomena that pursue intrinsic structure with respect to the subject of the study, and finding the meaning of the experience concretely[15][16]. Therefore, in order to confirm the participants' in-depth and comprehensive understanding, the conceptualization and segmentation of the subject-specific data through transcription was attempted.

Specifically, in step 1, the original data obtained through the interview were transcribed and repetitively identified in accordance with the entire statement. In the second stage, a text analysis process was conducted, focusing on the participants' renunciation of exercise and career change. In the third stage, participants' transcribed interviews were reviewed in terms of meaning, and the contents of giving up the Wushu movement and switching careers to Taekwondo were presented in academic terms. In the last four stages, the participants structurally integrated the meaning units stated by the participants to derive the process and experience of a Chinese Wushu major changing his career to a Korean Taekwondo leader.

2.4. Validity and reliability of research

The validity and reliability of a qualitative study are guaranteed when the subjective viewpoint and prejudice of the researcher are excluded and the theoretical orientation increases. Therefore, in this work, the validity of qualitative research presented by Glesne and the reliability of qualitative research methods presented by Lincoln and Guba[17] were applied. First, in determining the feasibility of the study, member checks were conducted by selecting two participants who had given up during the study and had converted to Taekwondo leaders and re-evaluated the validity of the result of the study.

In addition, in the process of reviewing the interpretation of the data, triangulation was used to conduct expert consultation, and the collected data for derivation of the research results were supplemented with expert advice and comments. Secondly, for the reliability of the study, it present concrete data to determine the situation and meaning of the phenomenon through deep description by applying truth value, applicability, consistency, and neutrality, which are the criteria of judgement for qualitative research compared to quantitative research.

3. Results

3.1. Situational structure and statements regarding participants' career transition experiences

The results of the study were divided into situational structured statements and general structured statements, and in the situational structured statement, 5 elements, 16 sub-elements, and a total of 54 semantic units were found. According to the data analysis, five major components were found in the meaning of a Chinese Wushu major's career transition to a Korean Taekwondo leader: a "hardened Wushu education system", a "lack of Wushu operation management system", "choice of Taekwondo as a popular job", and "regret and desire of giving up on Wushu".

Table 3. Components of the participant's career transition experience.

Theme	Focal meaning	Significant statements
Rigid wushu education system	Problems in the transfer process	•The apprenticeship transmission process is an unnecessary element in modern society. •The choice of successor is too tricky. •It is too far from the modern curriculum.

	Differentiation between sports wushu and traditional wushu	•The spread of traditional wushu has been neglected. •There are many detailed martial arts of traditional wushu, but they are not active because they are covered in the shade of sports wushu. •Only the performance of the sports wushu is recognized as the best.
	Intense training and injuries	•Hard due to intense training •There are cases of frequent injuries. •In some cases, more intense training is required than necessary.
	Performance-oriented sports wushu	•Sports wushu does not include the national spirit of traditional wushu and has a lot of show-style performances. •Sports wushu is not helpful in combat martial arts. •The combination of attack and defense characteristics of traditional wushu is disappearing.
Lack of wushu operation management system	Need to maintain the content of the grade test	•Taekwondo formed a unified grading culture of kukkiwon grading, but wushu has a lot of confusion due to its strong regional characteristics. •Even wushu players are often not familiar with their level. •It is necessary to establish a rating system according to the development direction of traditional wushu and sports wushu. •Standardized grade test content is essential.
	Absence of grade-level training programs	•Training for each class according to the wushu event should be concrete. •If the trainee's grade is divided into classes like Taekwondo, the sense of achievement of the trainee can be enhanced. •For efficient training, it is necessary to classify programs for beginner, intermediate, and advanced levels.
	Lack of management of various competitions and operations	•A wide variety of competitions should be held by holding wushu competitions by age and grade. •It is necessary to change the curriculum to learn wushu as a compulsory subject from elementary school in China. •The current competition system is insufficient to meet the participation demand of wushu players. •Need more ideas for continuous online promotion.
Choosing a livelihood for employment	Wushu school, which is harder to find than Taekwondo school	•In the city, the wushu training center almost disappears, and Taekwondo training center is mostly used. •It is easy to get a job as a Taekwondo instructor. •More people are engaged in Taekwondo training center, who have more economic profits than wushu.
	Choosing taekwondo as a minor	•Chose Taekwondo as a minor in order to get a job. •Taekwondo has been adopted as an official Olympic sport, so it has a higher awareness than wushu. •Many of the wushu majors naturally choose Taekwondo as their minor.
	Lack of employment opportunities for wushu majors	•There are too many wushu majors. •The reality that it is difficult to get a job as a wushu leader due to the disappearance of the wushu training center and many Taekwondo schools. •There are not many places where wushu leaders can work.
Choosing taekwondo as a popular occupation	Great performance	•Taekwondo's stage performance has become an object of interest and fun to many people. •Taekwondo performance has transformed into a performance genre by combining martial arts elements, dance, and music. •Unlike wushu, it combines exciting music and dance movements, so children like it and people who watch it are also fun.
	Value etiquette	•Taekwondo's good manners by bowing the waist deeply are receiving a lot of response. •Taekwondo trainees are equipped with a polite appearance to

		others. •It is taught that the first thing in Taekwondo training is etiquette.
	Taekwondo trainees increase	•Parents are satisfied with their children who change through Taekwondo training. •Taekwondo dojo teaches about politeness and filial piety that are forgotten in China. •Compared to wushu, Taekwondo training can be effective in a short time. •The fun training method of Taekwondo is recognized.
	Economically prosperous due to increased income	•Taekwondo is easy to recruit students. •Working at a taekwondo school earns more than working at a wushu school. •Since college, worked as a Taekwondo instructor for living expenses.
Regret and wind of giving up midway in wushu	Regret of giving up halfway	•Regret of giving up in wushu for a living. •There are many excellent contents of traditional wushu, but it is regrettable that I could not learn properly. •I gave up halfway due to the absence of the wushu leader management program, but I plan to practice wushu again someday.
	Hope there will be a change for wushu majors	•I hope to bring more interest to the leaders of wushu major and give them an opportunity to act as leaders. •There is a need for a drastic change in wushu management through changes in the operation and education system. •We need a social device so that we can be proud as a wushu leader.

3.2. General structures and statements regarding participants' experience in career transitions

In phenomenological research, the process of general structure statement and application is the process of integrating the structure of participants' experiences. General structural statements are a comprehensive process that must be integrated into a generalized sentence, taking into account all the meanings of the participants' experiences[18]. According to Giorgi, if the individual situation, uniqueness, and personal context of the participants were revealed in the contextual structural statements, the general rescue statement should reveal the structure of the participants' common experiences[15].

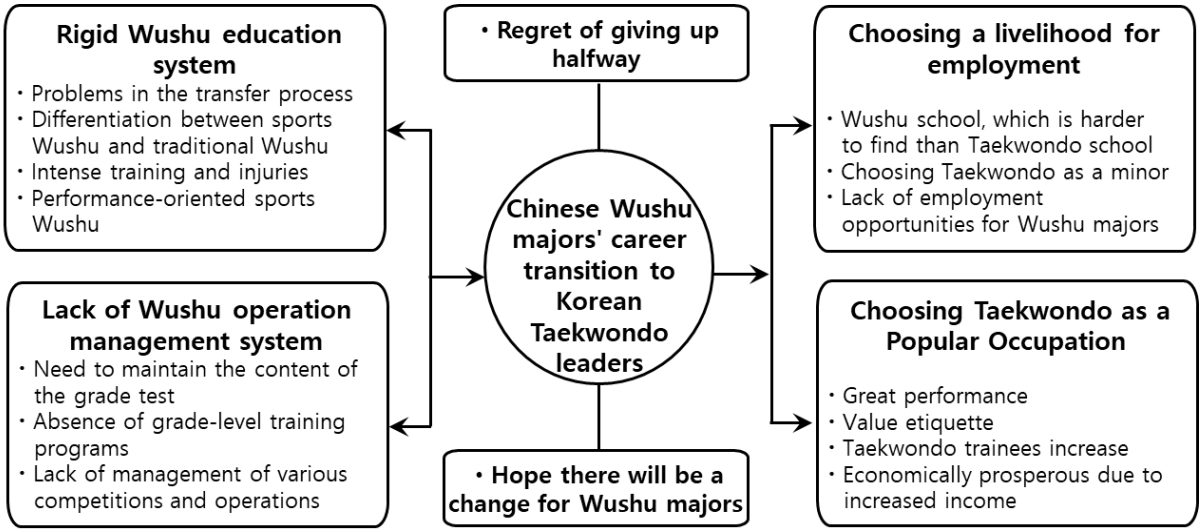
Participants who had been majoring in Wushu in China changed their careers to Taekwondo leaders, changing jobs and earning a living. Participants felt desperately the lack of management of Wushu operations under the rigid Wushu education system. Under the shadow of Competition Wushu, traditional Wushu did not attract attention, and participants knew that the apprenticeship process was far from the modern curriculum. They also have painful memories of more than necessary injuries due to intense training.

Participants agreed with Taekwondo's unified Kukkiwon certification, step-by-step rapid increase, and differentiated training programs. Currently, Wushu had negative thoughts about the reality that there is no standardized grade test and that no beginner, intermediate, or advanced stage training is being conducted for efficient training. Moreover, even in the national Wushu competition, it was not enough to meet the demands of the participating athletes, so they wanted to host a wide variety of national competitions by age and grade.

Participants gave up their way to China's Wushu leader and changed their careers to Taekwondo masters and directors, which had already been implemented since they were in college. Wushu studio is harder to find than a Taekwondo studio, and athletes were experiencing that they were getting a job well as Taekwondo leaders, so they were choosing

Taekwondo as their minor. Therefore, they changed their career as a Taekwondo leader who was easier to find and had more economic profits than Wushu. On this basis, compared to many Wushu majors, the Wushu studio has gradually disappeared and the number of Taekwondo studio has increased, reflecting the reality that it is difficult to get a job as a Wushu leader.

Figure 1. General structure of the participant's career transition experience.



There were many factors behind Taekwondo's popularity in China. First of all, the wonderful performance brought interest and fun to many people, and unlike Wushu, the genre was changing in the form of a performance by combining exciting music and dance movements. Also, since Taekwondo places importance on etiquette, people thought that learning Taekwondo would lead to a polite appearance to adults, families, and coaches. Therefore, parents were satisfied with the changing appearance of their children through Taekwondo training, and trainees also preferred Taekwondo, which trained them with fun.

Participants felt regret about giving up as a Wushu leader, and they were hoping for a change for Wushu majors. In some cases, they wanted to learn the traditional Wushu properly and succeed, and one day he wanted to become a Wushu leader again. They were calling for drastic changes in the current Wushu operation and management system, and felt that they desperately needed to reorganize their social devices so that they could act with pride as a Wushu leader. <Figure 1> above is a chart showing the contents of the career transformation of a Chinese Wushu major as a Korean Taekwondo leader in accordance with a general structural statement.

4. Conclusion and Recommendations

This study was conducted using Giorgi's phenomenological research method, which is a qualitative research method, on the process and experience of the Chinese Wushu majors giving up their exercise and transitioning to career as a Korean Taekwondo leader. Through in-depth interviews with participants, components, sub-elements, and units of meaning were derived for the process of career transition to confirm what kind of experiences they were experiencing. This was carried out in order to derive realistic problems for the development of Wushu by grasping what are the realistic problems perceived by Wushu leaders and what caused the abandonment.

The result of the comprehensive analysis was finally integrated into a total of 75 semantic units, 16 sub-elements, and 5 elements. Due to the rigid Wushu education system and the lack

of Wushu operation management system, participants make subsistence choices for employment, and to shift their careers to Taekwondo leaders who were easy to recruit and easy to get a job. In addition, there was a sense of regret for Wushu's abandonment, and it was hoped that a drastic change would be made for Wushu majors.

Based on the results of this study, from a three-dimensional perspective, various factors can be seen in the background of Wushu's transition to Korean Taekwondo leader. In modern martial arts, the trainee is the customer and maintains a cooperative relationship through interaction with the director or master. In addition, the quality of the program can be improved through this partnership, and it can also determine satisfaction with the training program. Moreover, when trainees use the training program and recommend it to others, feedback is provided, and it plays a decisive role in recruiting other trainees with a positive image [19][20]. Furthermore, the fear of infectious diseases caused by the pandemic of COVID-19, which started after 2020, has resulted in restrictions on daily life, and social distancing has been strengthened and external activities have decreased, leading to a major change in lifestyle[21][22][23]. Therefore, there is a rapid change in the way of teaching martial arts leaders, mutual exchanges with trainees, and gym management.

The results of this study suggest in concrete and vivid language why Wushu majors, who represent Chinese culture and are loved by Chinese people, switch to Taekwondo leaders. It was possible to examine the reasons why Wushu majors drop out, and through this, it was possible to discover the intrinsic and external problems perceived by Wushu majors. In addition, it is said that the research is meaningful in that it has suggested proposal for the sustainable development of Wushu majors through the research results.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	HT	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑
Corresponding Author*	JL	-Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Co-Author	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 ☑

2021 6(2) 10-21 Submission: 2021/05/10, Peer review: 2021/05/20, Accepted: 2021/05/25, Published: 2021/06/30

International Journal of Martial Arts

Publisher: J-INSTITUTE
ISSN: 2423-835X

Website: www.j-institute.jp/martialarts/
Editor: martialarts@j-institute.jp

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dx.doi.org/10.22471/martialarts.2021.6.2.10

The Effects of the Perception of TAEKWONDO Demonstration Team Activities on the Image of Centers and the Intention to Join Trainees

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Abstract

Purpose: *The promotion, program, facility, and environmental factors of Taekwondo centers affect the image of Taekwondo centers, and the image of Taekwondo centers affects the continuation of training and word-of-mouth intention. The program also showed that Taekwondo demonstration activities had an effect on the image of the centers, but the study was conducted on parents and there was a lack of contents on the effect of the demonstration activities on the trainees in addition to the management factors. Therefore, the purpose of this study is to investigate the effects of Taekwondo demonstration team activities showing various skills on the image of centers and the intention of general trainees to join the training*

Method: *The participants of this study were 190 general trainees from 4th to 6th grade of elementary school who had been trained for at least one year at five Taekwondo centers operating a front-line demonstration team in Seoul and Northern Gyeonggi-do, and were sampled using a convenience sampling method among non-probability sampling methods. Among the collected questionnaires, all 162 were judged to be reliable except for 28 data that were judged to be unreliable, and the analysis was conducted based on a total of 162 questionnaires.*

Results: *A regression analysis of the effect of the perception of demonstration team activities on the image of centers(operation) showed that personality cultivation effect(p=0.000) has a positive(+) effect on the image of operations at a statistically significant level, with an influence of 0.420. In addition, the regression model shows p=0.000, F=9.636 and the regression analysis formula shows R2=0.236, which shows the explanatory power of 23.6% of the total variance.*

Conclusion: *First, the perception of the demonstration team activities affects the painting image. Specifically, the effect of personality cultivation affects the operation and leadership, the effect of personality cultivation, physical effect, and technological development affect the expertise, and the effect of personality cultivation and technological development affect the social service. Second, the perception of the demonstration team activities affects the intention to join trainees. Specifically, the psychological effect and the personality cultivation effect affect the intention to join trainees. Third, the image of centers affects the intention to join trainees. Specifically, the social service affects the intention to join trainees.*

[Keywords] ***Team Activities, Intention, Join Trainees, Taekwondo, Demonstration***

1. Introduction

In Korea, the number of trainees who visit the centers is rapidly decreasing due to low birthrates, but there are 10,078 official registered centers in Korea, and the number of Taekwondo centers is increasing every year. In order to manage among many Taekwondo centers, the needs of trainees must be met, and leaders, facilities, and programs have been continually developed, and programs for the enjoyment and interest of school physical education, play physical education, and recreation have been also developed.

The main characteristics of the physical education program in Taekwondo centers are contribution

to school performance evaluation, seasonal health, hobby life and inducing interest, and personality education such as cooperation, consideration, compliance with rules, honor of adults, and responsibility[1]. Therefore, the effect of school physical education program is to raise the intention of parents' recommendation, secure competitiveness with competitive centers, maintain existing trainees, and secure new trainees by existing trainees[2]. However, as the proportion of school physical education and play physical education increases, the proportion of physical training and mind and body training of Taekwondo is lowered, and the essence of Taekwondo is losing. Recently, there has been an increasing number of demonstration teams consisting of elementary, middle and high school students. Through Taekwondo demonstration, it shows various skills such as basic movement, Poomsae, competition, self-defense, and defeat, thereby informing the audience of Taekwondo and inducing fun and interest, thereby inspiring them to learn Taekwondo. In particular, the Taekwondo demonstration is to increase the trust of parents and trainees through direct viewing, so the Taekwondo demonstration at venues such as promotion screening, public classes, and local events are more helpful than advertisements using the ground or media. Therefore, it is advantageous to operate the Taekwondo demonstration team efficiently to enhance the publicity effect of Taekwondo centers[3].

Taekwondo has built a global infrastructure in which more than 10,000 people, including the members of the international sports development cooperation, from 210 countries are training[4]. The effects of the demonstration team activities on the pilot team members are: cooperative spirit with the demonstration team activities by working with each other; patience with hard training; achievement when the demonstration was successfully performed; and pride in the demonstration activities. In addition, among Taekwondo trainees, demonstration team members have higher training satisfaction and continuous intention in all factors such as self-regulation, confidence, physical strength improvement, and friendship compared to inactive members. Through Taekwondo demonstration team activities, fun, achievement, skill improvement, college entrance, goal consciousness, attachment, and responsibility will affect the training satisfaction of demonstration team members, and training satisfaction will affect the training intention. The satisfaction and continuation of training of trainees further influences the recommendation intention[5]. Therefore, it is advantageous to induce the inactive group of Taekwondo demonstration team to join Taekwondo demonstration team, and it is possible that the satisfaction and continuation of the activity group lead to the recommendation of the inactive group and affect the participation of the demonstration team. Taekwondo is largely divided into sparring, poomsae, and breaking. In 1962, the Korea Tae-soodo Association(the former entity of the Korea Taekwondo Association) joined the Korea Olympic Committee[6].

The promotion, program, facility, and environmental factors of Taekwondo centers affect the image of Taekwondo centers, and the image of Taekwondo centers affects the continuation of training and word-of-mouth intention[7]. The program also showed that Taekwondo demonstration activities had an effect on the image of the centers, but the study was conducted on parents and there was a lack of contents on the effect of the demonstration activities on the trainees in addition to the management factors[8]. Therefore, the purpose of this study is to investigate the effects of Taekwondo demonstration team activities showing various skills on the image of centers and the intention of general trainees to join the training.

2. Methods

2.1. Subject of study

The participants of this study were 190 general trainees from 4th to 6th grade of elementary school who had been trained for at least one year at five Taekwondo centers operating a front-line demonstration team in Seoul and Northern Gyeonggi-do, and were sampled using a convenience sampling method among non-probability sampling methods. Among the collected questionnaires, all 162 were judged to be reliable except for 28 data that were judged to be unreliable, and the analysis was conducted based on a total of 162 questionnaires.

The demographic characteristics of 162 people who were finally used were 101 men(62.8%) and 61 women(37.7%) as shown in <Table 3> below. And, as to the training period, 12 people(7.4%) for more than one year to two years, 29 people(17.9%) for more than two to three years, 22 people(13.6%) for more than three to four years, 19 people(11.7%) for more than four to five years, and 80 people(49.4%) for more than five years. And, as to the type of experiences of watching, 92 people(56.8%) in training, 33 people(20.4%) in performance, and 37 people(22.8%) in match. And, as to the type of acquaintances working as members of the Taekwondo demonstration team, 7 people(4.3%) none, 7 people(4.3%) brothers, 110 people(67.9%) friends, and 38 people(23.5%) acquaintances.

Table 1. General characteristics of research participants.

Classification		Cases(people)	Percentage(%)
Gender	Men	101	62.3
	Women	61	37.7
Training period	1-2 two years	12	7.4
	2-3 years	29	17.9
	3-4 years	22	13.6
	4-5 years	19	11.7
	More than 5 years	80	49.4
Experiences of watching	Training	92	56.8
	Performance	33	20.4
	Match	37	22.8
Members of the taekwondo demonstration team	None	7	4.3
	Brothers	7	4.3
	Friends	110	67.9
	Acquaintances	38	23.5

2.2. Measurement tool

2.2.1. Questionnaire composition

As demographic characteristics, gender, training period, the experience of watching, and members of the Taekwondo demonstration team, and all 4 questions were composed of multiple choice questionnaires. In order to compose questions about Taekwondo demonstration team activities, 19 questions were composed of modified and supplemented to suit this study based on the research of Kwan-cheol Byun(2005) and Dae-geon Hong(2013). And in order to construct questions about the image of the Centers, this study made up 17 questions by modifying and supplementing it to suit this study based on the relationship between the image of the Centers and consumer behavior according to Chang-dong Lee 's(2012) demonstration activities, and the relationship between the service quality of the youth sports club and the corporate image of Seung-wan Han(2017). To construct questions about the intention to join the demonstration team of trainees, the questionnaire used by Kwan-cheol Park(2011) was modified and supplemented to suit this study, and each question was composed of 6 questions, 5-point Likert scale from “not at all”(1 point) to “very yes'”(5 point)[8][9][10][11][12].

2.2.2. Validity and reliability verification

In this study, one professor majoring in sports industry and management and two demonstration team leaders reviewed the adequacy and appropriateness of the questionnaire draft based on prior research. In addition, the questionnaire was revised and supplemented by reviewing the clarity of the questionnaires by one child in the fourth, fifth and sixth grades who are working on the demonstration team to verify the face validity of the questionnaire drafts. And then, a preliminary survey was then conducted to verify the reliability and validity of the questionnaire prior to conducting this survey.

Investigative factor analysis and reliability analysis were then conducted using the SPSS Statistical Program 21.0 based on the final survey collected. For factor analysis of the perception of Taekwondo demonstration team activities, the image of centers, and intention of trainees to join, the main ingredient factor analysis was conducted, and the reliability of each factor was verified by calculating the Cronbach's value.

For factor-specific reliability verification of the perception of Taekwondo demonstration team activities, Cronbach's alpha values were calculated as shown in <Table 2>, Personality cultivation effects(.856), psychological effects(.864), showing off effect(.825), physical effects(.723) and technological advancements(.703).

Table 2. Factor analysis and reliability of the perception of taekwondo demonstration team activities.

Questions	Personality cultivation effect	Psychological effect	Showing off effect	Physical effect	Technological advancement effect
Personality cultivation 2	.753	.052	.137	.104	.196
Personality cultivation 3	.746	.225	-.037	.172	.032
Personality cultivation 5	.738	.158	.239	.149	.020
Personality cultivation 4	.709	.240	.229	.038	.036
Personality cultivation 6	.705	.166	.225	.037	.030
Personality cultivation 1	.648	.163	.024	.233	.224
Psychological effect 1	.206	.872	-.035	.017	-.041
Psychological effect 2	.212	.810	.208	.189	.140
Psychological effect 3	.239	.712	.236	-.008	.215
Psychological effect 4	.254	.699	.212	.317	.186
Showing off effect 3	.120	.121	.840	.104	.055
Showing off effect 2	.224	.154	.812	.147	.100
Showing off effect 1	.223	.125	.755	.107	.158

Physical effects 1	.204	.164	.117	.823	-.002
Physical effects 2	.039	.127	.048	.817	.088
Physical effects 3	.213	-.004	.150	.673	.050
Technological advancements 2	.118	.081	.064	.112	.816
Technological advancements 3	.170	.041	.001	.056	.816
Technological advancements 1	.011	.218	.312	-.033	.649
Eigenvalue	3.545	2.755	2.400	2.116	1.996
Variance(%)	18.659	14.500	12.630	11.133	10.505
Cumulative(%)	18.659	33.159	45.789	56.922	67.427
Cronbach's alpha(α)	.856	.864	.825	.723	.703

For factor-specific reliability verification of the image of Centers, the Cronbach's alpha values were calculated as community service 0.837, leadership 0.777, professionalism 0.801, and operations 0.758 as shown in <Table 3>.

Table 3. Factor analysis and reliability of the image of centers.

Questions	Community service	Leadership	Professionalism	Operations
Community service 1	.792	.105	.157	.074
Community service 2	.781	.132	.088	.250
Community service 4	.781	.222	.074	.245
Community service 3	.710	.193	.278	.105
Leadership 2	.217	.774	.184	.212
Leadership 5	-.009	.750	.179	.092
Leadership 4	.338	.632	.106	-.033
Leadership 1	.253	.563	-.010	.297

Leadership 3	.099	.533	.307	.334
Professionalism 2	.049	.175	.818	.094
Professionalism 1	.127	.417	.741	.062
Professionalism 3	.283	.064	.693	.214
Professionalism 4	.217	.038	.632	.413
Operation 3	.274	.129	.177	.765
Operation 2	.184	.006	.203	.734
Operation 1	.169	.378	.227	.618
Operation 4	.027	.390	.038	.593
Eigenvalue	2.869	2.798	2.510	2.480
Variance(%)	16.875	16.460	14.762	15.587
Cumulative(%)	16.875	33.335	48.097	62.684
Cronbach's	.837	.777	.801	.758

For reliability verification of the intention to join trainees, the Cronbach's alpha values were calculated as 0.965 as shown in <Table 4>.

Table 4. Factor analysis and reliability of the intention to join trainees.

Questions	Intention of trainees to join
Intention to join trainees 5	.946
Intention to join trainees 3	.938
Intention to join trainees 4	.937
Intention to join trainees 6	.918
Intention to join trainees 2	.898
Intention to join trainees 1	.897
Eigenvalue	5.106
Variance(%)	85.099
Cumulative(%)	85.099
Cronbach's	.965

2.2.3. Data collection

The researcher asked the leaders of Taekwondo centers in Seoul and Northern Gyeonggi-do to ask for their understanding and visited the Taekwondo centers for 11 days from March 22 to April 02, 2021, to explain the purpose of the survey and the significance of the survey and distribute the questionnaire. The questionnaire was answered by self-assessment method, and the response data was collected on the spot.

2.2.4. Data processing

After collecting the answered questionnaire, data that were deemed unreliable, such as data that were not filled in and answered in the same number consecutively, were excluded from the analysis list, and the data that could be analyzed was coded and computerized according to the purpose of analysis using the SPSS/PC + 21.0 statistical program for Windows. The effects of the perception of demonstration team activities on the image of centers, the intention to join trainees, and the effects of the image of centers on the intention to join trainees were examined by multiple regression analysis, and the significance level was set to 0.05.

3. Results

3.1. The effects of the perception of demonstration team activities on the image of centers

Table 5. The effects of the perception of demonstration team activities on the image of centers.

	Operations			Leadership			Professionalism			Community service		
	B	*Beta*	*t*	*B*	*Beta*	*t*	*B*	*Beta*	*t*	*B*	*Beta*	*t*
(Constant)	.417		5.193***	.304		8.796***	.422		5.283***	.456		1.194
Psychological effect	.063	.069	.795	.046	.060	.756	.064	-.047	-.525	.069	.045	.577
Technological advancement	.065	.028	.372	.047	.135	1.942	.065	.229	2.911**	.071	.147	2.132*
Physical effect	.084	.103	1.333	.061	-.079	-1.107	.085	.182	2.270*	.091	.108	1.540
Personality cultivation effect	.082	.420	4.755***	.060	.491	6.069***	.083	.252	2.760**	.090	.414	5.183***
Showing off effect	.055	-.081	-.986	.040	.081	1.085	.056	-.084	-.998	.060	.097	1.306
	R^2=.236, F=9.636***			R^2=.357 F=17.352***			R^2=.182 F=6.939***			R^2=.374 F=18.603***		

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

The results of a multiple regression analysis on the effects of the perception of the demonstration team activities, on the image of centers are as shown in <Table 5>.

First, a regression analysis of the effect of the perception of demonstration team activities on the image of centers(operation) showed that personality cultivation effect(p=0.000) has a positive(+) effect on the image of operations at a statistically significant level, with an influence of 0.420. In addition, the regression model shows p=0.000, F=9.636 and the regression analysis formula shows R2=0.236, which shows the explanatory power of 23.6% of the total variance.

Second, a regression analysis of the effect of perceptions of demonstration team activities on the image of centers(leadership) shows that personality cultivation effect(p=0.000) has a positive(+) effect on the image of leadership at statistically significant levels, with an influence of 0.491. In addition, the regression model shows p=0.000, F=17.352 and the regression analysis formula shows R^2=0.357,

which shows the explanatory power of 35.7% of the total variance.

Third, a regression analysis of the effects of the perception of demonstration team activities on the image of centers(professionalism) shows that personality cultivation effect(p=0.006), technological advancement effect(p=0.004), and physical effect(p=0.025) have positive(+) effects on the image of professionalism at statistically significant levels, with influences followed by personality cultivation effect(0.252), technological advancement effect(0.229), and physical effect(0.182). In addition, the regression model shows p=0.000, F=6.939 and the regression analysis formula shows R^2= 0.182, which shows the explanatory power of 18.2% of the total variance.

Fourth, a regression analysis of the effect of the perception of demonstration team activities on the image of centers(community service) shows that personality cultivation effect(p=0.000) and technological advancement effect(p=0.035) have positive(+) effects on the image of community service at statistically significant levels, with influences followed by personality cultivation effect(0.414), and technological advancement effect(0.147). In addition, the regression model shows p=0.000, F=18.603 and the regression analysis formula shows R^2=0.374, which shows the explanatory power of 37.4% of the total variance.

3.2. The effects of the perception of demonstration team activities on the intention to join trainees

The results of a multiple regression analysis as to the effects of the perception of demonstration team activities, on the intention to join trainees are as shown in <Table 6>.

A regression analysis of the effect of the perception of demonstration team activities on the intention to join trainees showed that physical effect(p=0.000) and personality cultivation effect(p=.012) have positive(+) effects on the image of operation at statistically significant levels, with influences followed by physical effect(0.319), personality cultivation effect(0.222). In addition, the regression model shows p=0.000, F=10.540 and the regression analysis formula shows R^2=0.253, which shows the explanatory power of 25.3% of the total variance.

Table 6. Effects of the perception of demonstration team activities, on the intention to join trainees.

	Intention to join trainees		
	B	*Beta*	*t*
(Constant)	.711		1.430
Psychological effect	.108	.319	3.723***
Technological advancement	.110	-.030	-.397
Physical effect	.143	-.030	-.387
Personality cultivation effect	.140	.222	2.547*
Showing off effect	.094	.091	1.131
		R^2=.253, F=10.540***	

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

3.3. The effects of the image of centers on the intention to join trainees

The results of a multiple regression analysis as to the effects of the image of centers, on the intention to join trainees are as shown in <Table 7>.

A regression analysis of the effect of the image of centers on the intention to join trainees showed that community service(p=.018) had a positive effect on academic adaptation under statistically significant levels, with an influence of 0.222. In addition, the regression model shows p=0.007, F=3.658 and the regression analysis formula shows R^2=.085, which shows the explanatory power of 8.5% of the total variance.

Table 7. Effects of the image of centers on the intention to join trainees.

	Intention to join trainees		
	B	*Beta*	*t*
(Constant)	.832		2.406*
Operation	.171	.048	.480
Leadership	.214	.123	1.254
Professionalism	.167	-.091	-.959
Community service	.133	.222	2.390*
		R^2=.085, F=3.658**	

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

4. Discussions

4.1. The effects of the perception of demonstration team activities on the image of centers

Among the factors of the perception of demonstration team activities, the effect of cultivating personality was found to have a significant effect on the operation and leadership among the factors of the image of centers. First of all, Taekwondo demonstration team activities seem to be highly perceived as a result of the demonstration team activities including physical strength improvement and personality education as well as overall technology in Taekwondo. It is interpreted that the effect of cultivating personality due to the demonstration team activities highly evaluates the leadership and reliability of the leader. In addition, the number of members of the World Taekwondo Federation is 209 countries as of 2019, more than 206 Olympic countries and 84 percent of 249 countries by the International Organiza-tion for Standardization[13].

The effect of personality cultivation, physical effect, and technological development effect were found to affect professionalism. The expertise and experience of the demonstration will help the development of physical development and personality by improving the skill and difficulty of Taekwondo movement and technology through experience such as demonstration, competition, and competition, and managing members through the demonstration training program such as physical strength and personality education. Previous studies have suggested that the importance of courtesy to professional knowledge should be recognized in Taekwondo training, and that the professionalism of the leader affects the knowledge of the sport and the management of the player[14][15].

With the founding of the Kukkiwon Demonstration Team in 1974, taekwondo demonstration played a significant role in promoting and disseminating taekwondo not only in Korea but also around the world[16]. The effects of personality cultivation and technological advancement among the perception factors of the demonstration team activities were found to have significant effects of community service among the factors of the image of centers. It seems to affect social service as a Taekwondo centers that shows Taekwondo's colorful movements and various skills through local events and festivals, informs local residents of Taekwondo, and gives pleasure and interest. In addition, by preparing for the demonstration with the demonstration team members, it will help to increase the sense of responsibility and cooperation for the technology that he/she has. According to previous studies, in order not to harm the members of the demonstration team, the members felt the necessity of self-management, and the communication between the team members and the development of personal

skills had a positive effect on the performance satisfaction. And through the demonstration performance of Taekwondo, not only the members but also the spectators became interested in the demonstration of Taekwondo, and the promotion and competitiveness of Taekwondo centers were brought [17][18].

4.2. The effects of the perception of demonstration team activities on the intention to join trainees

The psychological effect and personality cultivation effect among the perception factors of the demonstration team activity were found to affect the intention to join. The trainees who want to join the demonstration team think that they will learn wonderful skills and join the charm of showing, but psychological effects such as fun, joy and interest are important. It was found that they learned various techniques that they had not experienced in the existing training program, and enjoyed the fun and joy of Taekwondo gymnastics that combined colorful and cool movements and dances to music. In addition, it seems to be attracted and joined in the effort such as cooperation and consideration of the demonstration unit. According to previous studies, trainees felt the fun and interest of Taekwondo demonstration team training, and they said that they increased the educational effect of trainees[19]. In addition, it was found that the satisfaction of the elementary Taekwondo trainees' activities in the demonstration team had an effect on personality cultivation, and the discipline and rules through the demonstration team activities had an effect on the basic life attitude and community consciousness through group activities, and the results of this study are supported[20].

4.3. The effects of the image of centers on the intention to join trainees

Among the factors of the image of centers, social service was found to affect the intention to join trainees. Local festivals and events are held by local governments to promote local specialties and tourist products. By helping local events through Taekwondo demonstration and showing various Taekwondo techniques such as basic movements, Poomsae, competition, self-defense, and defeat, it contributes to informing the audience of Taekwondo and inspires fun and interest to learn Taekwondo. taekwondo demonstrations were carried out as a means to promote taekwondo as an official Olympic event[21]. The demonstration of Taekwondo at the event-venue was said to affect Taekwondo promotion, securing competitive advantage in Taekwondo management, and expanding the base of Taekwondo training population, and according to the results of previous studies, Taekwondo demonstrations can promote the training form and training skills of Taekwondo instructors, the qualities of instructors, and the atmosphere of Taekwondo stamps, and it is said that it is an opportunity for non-trainees to enter Taekwondo centers by inducing novelty, impression, and interest[19][22].

5. Conclusion and Suggestion

The purpose of this study is to provide differentiated management strategies of Taekwondo centers by the effective demonstration team activities and operation of Taekwondo centers by identifying the perception of the demonstration team activities in Taekwondo stamps, the image of the centers, and the relationship between the trainees' intention to join.

First, the perception of the demonstration team activities affects the painting image. Specifically, the effect of personality cultivation affects the operation and leadership, the effect of personality cultivation, physical effect, and technological development affect the expertise, and the effect of personality cultivation and technological development affect the social service.

Second, the perception of the demonstration team activities affects the intention to join trainees. Specifically, the psychological effect and the personality cultivation effect affect the intention to join trainees.

Third, the image of centers affects the intention to join trainees. Specifically, the social service affects the intention to join trainees.

Since this study was limited to Taekwondo centers in Seoul and Northern Gyeonggi-do, follow-up

studies need to be expanded to Taekwondo gyms in various regions. Also, since the subjects of the survey were trainees in the 4th grade of elementary school and 6th grade of elementary school in Taekwondo, it is necessary to pay attention to generalizing the results of the study to adolescents and adults, and continuous research should be carried out in the future.

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Author	HS	-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 ☑

2021 6(2) 22-32
Submission: 2021/05/10, Peer review: 2021/05/20, Accepted: 2021/05/25, Published: 2021/06/30

International Journal of Martial Arts

Publisher: J-INSTITUTE
ISSN: 2423-835X

Website: www.j-institute.jp/martialarts/
Editor: martialarts@j-institute.jp

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dx.doi.org/10.22471/martialarts.2021.6.2.22

The Structural Relationship among Desperateness, Mental Strength and Perceived Performance of High School TAEKWONDO Players

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Abstract

Purpose: *Players' desperateness is a mental state of readiness for training and competition, which is understood to be a variable that influences players' performance as a factor that promotes motivation for why they should participate and win. On the other hand, mental strength is psychological strength that directly affects the performance of players, so the relationship between these two variables is clearly classified into a sequential relationship, and finally, the perceived performance of players will be affected by the relationship between these two variables. In addition, it is possible to predict enough that mental strength will play a mediating role in the relationship between desperateness and perceived performance. Therefore, the purpose of this study is to understand the influence of high school Taekwondo players' perceived desperateness through structural relationships with their desperateness, mental strength, and perceived performance, and to help them improve their performance.*

Method: *A total of 281 high school Taekwondo players were selected as participants by convenience sampling technique, and they were asked with desperateness questionnaire, mental strength questionnaire, and perceived performance questionnaire. The data analysis of this study was executed by using PASW 23.0 and AMOS 23.0 for the frequency analysis, confirmatory factor analysis, reliability analysis, correlation analysis and the research model was test through structure equation modeling analysis and the bootstrapping method was used to find out the mediating effect.*

Results: *The desperateness had a positive relationship with mental strength. This is a result of predicting that the higher the level of desperateness, the higher the level of mental strength can be. Desperateness was also found to have a positive causal relationship with perceived performance meaning that the higher the level of desperation, the higher the level of performance perceived by athletes, and it is understood that the desperation of high school taekwondo players can help improve perceived performance. Mental strength had a positive causal relationship with perceived performance. It means the higher the level of mental strength, the higher the level of performance perceived by athletes, and it is understood that the mental strength of high school taekwondo players can help improve the perceived performance. Mental strength had a mediating effect in the relationship between desperateness and perceived performance.*

Conclusion: *The desperateness of athletes is a leading variable that positively influences the improvement of athletes' performance. Desperate is a state of mind preparedness for how high school Taekwondo players participate in sports and games, and it is understood that this mindset is expressed as a strong will for the purpose and direction of action, and it is judged to have a positive impact on the win or lose of the game. Since this study found mental strength had a positive causal relationship with perceived performance mental strength needs to be regarded as a major concern of leaders and coaches as a major factor in determining the win or loss of a game, and should be making continuous efforts to improve the mental strength of athletes.*

[Keywords] ***Desperateness, Eagerness, Mental Strength, Perceived Performance, Taekwondo***

1. Introduction

1.1. Needs and objectives of research

Taekwondo has been recognized as a world-class sport since it was selected as an official sport seven times in a row from the Sydney Olympics in 2000 to the Paris Olympics in 2024. However, a lot of efforts are required to protect the aspect of the suzerain state with the introduction of Electronic Body Protect and standardized performance, and measures are needed to improve the strong mental strength of Taekwondo athletes to perform the best[1].

From the interviews after Taekwondo athletes win the Olympics or World Championships, there is a word that makes Taekwondo athletes show strong mental strength. The words most often described by athletes as the driving force of strong motivation and mental strength are "eager" and "desperateness", which are implicitly expresses the athletes' mind for training and game preparation, and their desire to achieve goals[2].

Looking at the dictionary meaning of the term, eager means "the degree of desire that comes from the heart is very desperate", desperateness means "a state of intense feeling or thought" or "very urgent and vital condition"[3]. These terms are particularly helpful in understanding the level of the athletes' mental state as they reflect the specificity of fighting sports culture such as Taekwondo, Judo, Boxing, etc.

In this respect, Kwon, Moon and Ahn(2015) explored and developed the concept of “desperateness” and developed a measurement scale. “Desperateness” is a major factor in determining whether or not the psychological factors that determine the player’s performance are exercised[4]. It was said that it can be understood as a driving force for achieving their goals. Kwon, Moon and Ahn(2015) also explored the sub-factors of desperateness as expectations of success, self-control, patience and overcoming. They said that the three factors can be explained by the psychological factors that control the athletes' game readiness or performance in a game situation, and that they can help predict the best performance of the athletes[4].

In addition, prior studies related to this desperateness reported that athletes' desperateness has a positive impact on self-elasticity and training engagement[5], athletic immersion and perceived performance[6], athletic immersion and performance[7].

According to a study by Kwon, Jang, Lee, Lee, and Kim(2020), the relationship between concepts established from indigenous psychological perspectives such as desperateness and various variables changes the academic flow of adapting and utilizing factors developed in Western culture. It suggested that it could be used to give a good understanding of the domestic players' performance process[6].

On the other hand, mental toughness, which is a major factor in determining the performance of Taekwondo players, shows a strong will to constantly strive to improve performance higher than the current level, endures to achieve their goals in tough and difficult situations, or have a strong desire to win[2][8][9][10].

Looking at the characteristics of mentally strong players, they are consistent with confidence, positivity, pride and faith, and have high determination, concentration, courage and willpower[11]. In addition, he persevered with psychological adversity or physical pain caused by extreme stress and showed the characteristics of challenging to achieve goals without giving up until the end[12].

Ro and Kim(2011) divided mental strength into four factors: desire to win, concentrate, fighting spirit, and confidence[2]. According to the results of prior research related to mental strength, it is related to various variables such as self-management and performance[13], positive psychological capital[14], perception of success[15], sports confidence and achievement goal orientation[16], perceived performance[17][18], and is interpreted as a variable that has a positive impact on performance.

As such, mental strength and desperateness can be understood as having similar meanings as major variables affecting athletic performance, but there are clear differences between the

two variables. Desperateness is a psychological concept that represents the mental readiness of training or competition, reminding the reason and the justification for training and competition[5][19]. On the other hand, mental strength is psychological toughness that can be obtained through desperateness, and can be classified as a variable that has a decisive influence on the outcome of the game[13][17][18]. This was proved through related previous studies that desperateness and mental strength were the main variables that influence the performance.

In order to objectively analyze the player's performance, the actual performance should be measured, but there is a limit to setting objective performance as a variable due to time and situational constraints. Accordingly, the perceived performance of athletes is being used as an important criterion for evaluating the best performance. As studies show by Retirement Anxiety and Exercise Commitment[20], desperateness and exercise commitment[6], self-management and sport spirit[18], team cohesion and trust in the leader[21], perceived performance is being used as a measure to evaluate athletes' best performance.

In summary, players' desperateness is a mental state of readiness for training and competition, which is understood to be a variable that influences players' performance as a factor that promotes motivation for why they should participate and win. On the other hand, mental strength is psychological strength that directly affects the performance of players, so the relationship between these two variables is clearly classified into a sequential relationship, and finally, the perceived performance of players will be affected by the relationship between these two variables. In addition, it is possible to predict enough that mental strength will play a mediating role in the relationship between desperateness and perceived performance.

Taekwondo players, who are high school students, can have a lot of influence on their career paths depending on the level of desperateness, mental strength, and perceived performance dealt with in this study. Therefore, the purpose of this study is to understand the influence of high school Taekwondo players' perceived desperateness through structural relationships with their desperateness, mental strength, and perceived performance, and to help them improve their performance.

1.2. Study hypothesis

The research hypothesis conforming to the purpose of the study is as follows, and the research model is shown in <Figure 1>.

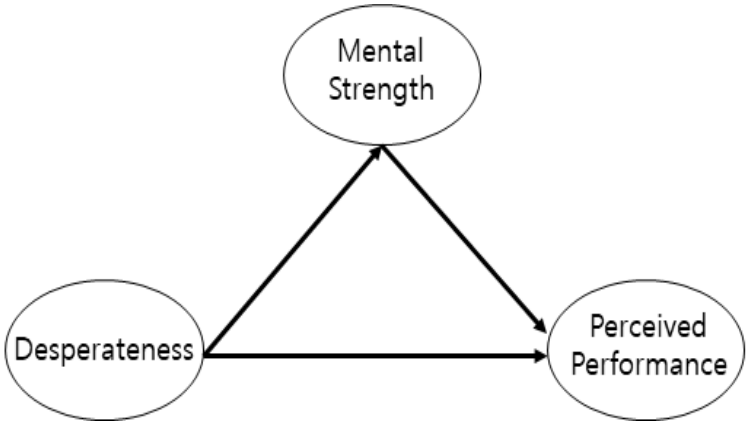
Hypothesis 1. Desperateness will affect mental strength.

Hypothesis 2. Desperateness will affect perceived performance.

Hypothesis 3. Mental strength will affect perceived performance.

Hypothesis 4. In the relationship between desperateness and perceived performance, mental strength will have a mediating effect.

Figure 1. Research model.



2. Research Method

2.1. Subject of study

During the survey, the content and method of the questionnaire were explained with prior consent from the instructor and athlete, and measured using a self-administered questionnaire. The survey time took about 30 minutes, and the researcher directly collected the survey. The general characteristics of the study subjects are shown in <Table 1>.

Table 1. General characteristics of the study subjects.

Variables		N	%
Sex	Male	184	65.5
	Female	97	34.5
Grade	1st grade	106	37.7
	2nd grade	102	36.3
	3rd grade	73	26.0
Total		281	100

2.2. Feasibility and reliability of measurement tools

To increase the validity of the measurement tool, a group of experts(2 professors in sports psychology, 2 professors in measurement evaluation, and 1 Ph.D. in sports psychology) was formed to confirm the content validity of the measurement tool. Before the survey, three Taekwondo athletes confirmed the understanding and appropriateness of the questions. Confirmatory factor analysis was performed to test the validity of the job offer, and Cronbach's α coefficient was calculated for the reliability test.

2.2.1. Desperateness

To measure the desperateness of Taekwondo athletes, the desperateness scale developed by Kwon, Moon, and Ahn(2015) was used[4]. The scale consisted of 3 factors, 15 questions, self-discipline(5 questions), patience and overcoming(5 questions), and expectation for success(5 questions), and consisted of a 6-point Likert scale. As a result of the confirmatory factor analysis, 4 questions with low squared multiple correlations(SMC) were deleted(1 question for expectation of success, 1 question for self-restraint, 2 questions for patience and overcoming). The Q

value was 3.587, the TLI value was .935, the CFI value was .948, and the RMSEA value was .070, confirming the fit of the model. As a result of reliability analysis, the value of Cronbach's α is .87–91, which ensures reliability.

2.2.2. Mental strength

To measure the mental power of Taekwondo athletes, a Taekwondo athlete's mental power measurement tool developed by Noh and Kim(2011) was used[2]. It was composed of 19 questions with 4 factors, including desire to win(6 questions), concentration(6 questions), fighting spirit(4 questions), and confidence(3 questions), and was composed of a 5-point Likert scale. As a result of confirmatory factor analysis, 6 questions with low squared multiple correlations(SMC)(2 questions for game desire, 2 questions for concentration, 1 question for fighting spirit, 1 question for confidence) were deleted. The Q value was 3.210, the TLI value was .949, the CFI value was .953, and the RMSEA value was .065, confirming the fit of the model. As a result of reliability analysis, the value of Cronbach's α is .83-89, which ensures reliability.

2.2.3. Perceived performance

The performance evaluation paper developed by Mamassis and Doganis(2004) was used to measure the perceived performance of Taekwondo players[22]. It consisted of 8 questions with a single factor on a 5-point Likert scale. As a result of confirmatory factor analysis, 3 items with low squared multiple correlations(SMC) were deleted. The Q value was 2.899, the TLI value was .954, the CFI value was .972, and the RMSEA value was .056, confirming the suitability of the model. As a result of reliability analysis, the value of Cronbach's α is .92, which ensures reliability.

2.3. Data processing

The data processing of this study was analyzed according to the purpose of this study using PASW 23.0 and AMOS 23.0 programs. To test the measurement tools and reliability, reliability analysis(Cronbach's α) and confirmatory factor analysis were performed, and the standards of fitness of the model were based on the previous studies[23][24]. NNFI(TLI), CFI was evaluated as .80 ~ .90 or more, and RMSEA was evaluated as .05 ~ .08 or less. Frequency analysis was performed by setting demographic variables, and descriptive statistical analysis was performed to confirm the assumption of normal distribution, and the mean, standard deviation, skewness, and kurtosis were analyzed. In addition, a confirmative factor analysis was performed to validate the construct validity of the overall measurement model, resulting in factor loading and a conceptual reliability(CR) and an Average Variance Extraction(AVE). At this time, when the CR value is 0.7 or more and the AVE value is 0.5 or more, the centralized validity is supported, and when the AVE value is greater than the coefficient of determination(the square of the correlation coefficient between factors; r^2), it can be evaluated as supporting the discriminant validity[25]. Finally, to verify the research model, the structural relationship between each variable was tested through structural equation modeling(SEM), and the bootstrapping method was used to find out the mediating effect.

3. Result

3.1. Descriptive statistics analysis of each variable

The results of descriptive statistics analysis of sub-factors of each variable are shown in <Table 2>. Patience and overcoming(M=5.24, SD=.68) were the highest, followed by self-restraint(M=5.16, SD=.62), and expectation of success(M=4.89, SD=.74). As a result of analyzing skewness and kurtosis to verify normality, it was found that the skewness and kurtosis did not exceed ±2, which satisfies the normality.

Table 2. Technical statistics analysis.

Variables	M	SD	Skewness	Kurtosis
1. Expectation of success	4.89	.74	.256	.347
2. Self-control	5.16	.62	-.357	.741
3. Patience and overcoming	5.24	.68	-.741	.681
4. Desire to win	4.15	.41	.547	.667
5. Confidence	4.28	.33	-.247	-.339
6. Fighting spirit	4.09	.67	.203	.309
7. Confidence	4.31	.41	-.742	.684
8. Perceived performance	4.11	.54	.645	.588

3.2. Measurement model evaluation

Confirmatory factor analysis was conducted to verify the construct validity of the entire measurement model. The fit of the measurement model was found to be good(Q=2.554, TLI=.937, CFI=.956, RMSEA=.065). The standardization coefficients of the sub-factors explained from the latent factors were found to be .654 to .921, indicating that the explanatory power of the sub-factors was also appropriate. As a result of verifying the convergence and discriminant validity through the coefficient of determination between the CR value and the AVE value concept for the sub-factor, the measurement model has a constructive validity, as shown in <Table 3>.

Table 3. CR and AVE values for the measurement model & interconcept determinants.

Variables	CR	AVE	Coefficient of determination(r^2)		
			Desperateness	Mental strength	Perceived performance
Desperateness	.901	.787	1		
Mental strength	.879	.685.	.387	1	
Perceived performance	.889	.657	.312	.547	1

Note: ***P<.001.

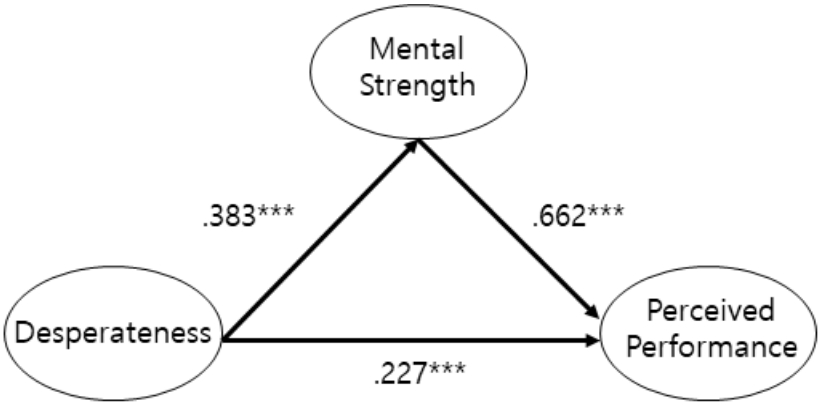
3.3. Research model verification

As a result of testing the fitness of the research model, it was found that the level of fitness was appropriate as TLI .942(>.90), CFI .955(>.90), and RMSEA .071(≤.08), and the results are shown in <Table 4>. The result of this research model is shown in <Figure 2>.

Table 4. Model suitability.

Variable	χ^2	df	TLI	CFI	RMSEA
Model suitability	123.155	51	.942	.955	.071

Figure 2. Research model results.



3.4. Hypothesis test

The research model set in this study appears to be suitable, and if the hypothesis is tested based on the results of the structural model analysis, it is shown in <Table 5>.

Hypothesis 1. The path coefficient of 'desperateness will affect mental strength' was .383(t=5.397, p<.001), indicating that desperateness had a statistically significant positive causal relationship with mental strength.

Hypothesis 2. A path coefficient of .227(t=3.424, p<.001) of 'desperateness will affect perceived performance' showed that there was a statistically significant positive causal relationship to perceived performance. .

Hypothesis 3. 'Mental strength will affect perceived performance' is a path coefficient of .662(t=6.770, p<.001), indicating that mental strength has been shown to have a statistically significant positive causal relationship with perceived performance.

Table 5. Hypothesis test results.

	Path	Path coefficient	Error	t-value
H1	Desperateness → mental strength	.383	.074	5.397***
H2	Desperateness → perceived performance	.227	.031	3.424***
H3	Mental Strength → perceived performance	.662	.022	6.770***

Note: ***P<.001.

3.5. Mediating effect test

The mediating effect used the bootstrapping technique. The number of repetition estimation was set to 2,000 and tested by 95% confidence interval. As a result of the test, since zero was not included between the lowest interval(.150) and the highest interval(.350), it was statistically significant at the casual significance level p<.05(α=.004), indicating that there was a mediating effect. It is as shown in <Table 6>.

Table 6. Mediating effect.

Path	Direct effect	Indirect effect	Total effect
Desperateness → mental strength	.383	.000	.383
Desperateness → perceived performance	.227	.254	.481
Mental Strength → perceived performance	.662	.000	.662

4. Discussion and Conclusion

4.1. Discussion

Based on the results of this study, it was found that desperateness had a positive cause-and-effect relationship with mental strength. This is a result of predicting that the higher the level of desperateness, the higher the level of mental strength can be. These results show similarities compared to prior studies that desperation is related to the psychological readiness of athletes, such as challenges and confrontations, self-management, and overcoming adversity[4][6][7] Compared with Kim(2016)[26].

In a study by Kwon et al.(2020), the desperateness is closely related to the entry stage and experience stage of exercise immersion[27] and helps set clear goals[28][29]. Lee(2020) supports this study by saying that athletes with high desperateness have the characteristic of being immersed in and devoting themselves to exercise, and thus have a high possibility of experiencing immersion effectively in exercise situations[19]. The results of these preceding studies reveal that the desperateness of athletes is a leading variable that positively influences the improvement of athletes' performance, but since various studies on the desperateness of athletes

have not yet been conducted, the relationship with various variables should be grasped. In this respect, it is necessary to provide more information by grasping the relationship between negative variables such as stress and anxiety rather than positive variables.

In addition, based on these results, there is a need for field leaders to instruct the players so that they can feel the desperate situation and timeliness of high school Taekwondo players, and to count the pains and hearts of the players. It is important to keep in mind that high school taekwondo players are inevitably worried and stressed about their performance and career, and the performance of training and competitions may vary depending on the level of desperateness the players have in this situation[30]. Therefore, sports leaders and researchers suggest the necessity of developing a program that can increase the desperateness of athletes and applying them to athletes.

Second, desperateness was found to have a positive causal relationship with perceived performance. These results predict that the higher the level of desperation, the higher the level of performance perceived by athletes, and it is understood that the desperation of high school taekwondo players can help improve perceived performance. This is supported by prior studies [6][7][19] that have a positive impact on perceived performance(competitive performance). However, it can be confirmed through previous studies that desperateness will affect performance through indirect effects rather than direct effects in terms of prerequisites for best performance.

Desperate is a state of mind preparedness for how high school Taekwondo players participate in sports and games, and it is understood that this mindset is expressed as a strong will for the purpose and direction of action, and it is judged to have a positive impact on the win or lose of the game.

Third, it was found that mental strength had a positive causal relationship with perceived performance meaning that the higher the level of mental strength, the higher the level of performance perceived by athletes, and it is understood that the mental strength of high school taekwondo players can help improve the perceived performance.

This is supported by previous studies[17][18][31][32] that mental strength has a positive effect on perceived athletic performance in various studies. Mental strength has been regarded as a major concern of leaders and sports researchers as a major factor in determining the win or loss of a game, and has been making continuous efforts to improve the mental strength of athletes. Looking at previous studies on the application of psychological skills training programs to foster strong mental strength[33][34][35], it was proved that the programs applied to athletes have proven effective in improving mental strength, and there is a need to develop programs with constant interest.

In addition, after confirming the relationship between desperateness and mental strength, the results of this study propose the necessity of developing a mental strength improvement program utilizing desperateness and applying it to Taekwondo players.

Finally, it was found that mental strength had a mediating effect in the relationship between desperateness and perceived performance. This result is understood that mental strength affected by desperateness has a positive effect on perceived performance. A previous study tested the mediating effect of athletic immersion in the relationship between desperation and perceived performance, supports this study[6]. This is because mental strength is a leading variable that can predict best performance, such as exercise immersion[36][37][38]. This mediating effect is the result of indicating that the exercise of performance determinants can be controlled by desperation, and the level of mental exertion determined by desperation, which is the level of psychological preparation in athletic situations, is understood to affect perceived performance[39]. In addition, the study is meaningful in that it can distinguish athletes' performance processes sequentially, and while efforts to improve mental and psychological skills are important, measures are needed to increase the level of desperation, the driving force and psychological posture.

4.2. Conclusion

The conclusions through this study are as follows.

First, desperateness was found to have a positive causal relationship to mental strength. Second, it was found that desperateness had a positive causal relationship with perceived performance. Third, it was found that mental strength had a positive causal relationship with perceived performance. Finally, it was found that mental strength has a mediating effect in the relationship between desperateness and perceived performance.

Based on this study, suggestions for follow-up studies are as follows.

First, this study is required to find out the relationship between desperateness and various psychological variables. In particular, there is a need to understand the relationship between negative psychological factors such as stress and anxiety. Second, there is a need to develop a mental strength improvement program utilizing desperateness and apply it to the field. Finally, if we find and study the concept of indigenous psychology as desperateness, it is judged that it will help a lot in improving the performance of Taekwondo players and understanding the psychological characteristics of Taekwondo players.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead 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 ☑
Corresponding Author*	HS	-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 ☑

2021 6(2) 33-41
Submission: 2021/05/10, Peer review: 2021/05/20, Accepted: 2021/05/25, Published: 2021/06/30

International Journal of Martial Arts

Publisher: J-INSTITUTE
ISSN: 2423-835X

Website: www.j-institute.jp/martialarts/
Editor: martialarts@j-institute.jp

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dx.doi.org/10.22471/martialarts.2021.6.2.33

The Meaning and Value of Yusool from the Modern MILITARY Perspective after the Imjin War

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Abstract

Purpose: *The military aspects of the Imjin Invasion and the background of Japan's military and yusool establishment in the late Joseon Dynasty were investigated, and a thorough investigation was conducted on Joseon yusool used in hand-to-hand combat as a martial art of the Joseon dynasty. Yusool and Japanese military tours in the late Joseon Dynasty, they investigated Joseon Yusool from the Joseon Training Institute, and in particular, reviewed and analyzed the meaning and value of Yusool from a modern military perspective after the Korean-Japanese Japanese Invasion. Its purpose is to present Yusool as a martial art.*

Method: *This research method examines in-depth the meaning and value of Yusool viewed from the modern military side after the Japanese Invasion of Korea and Japan, and provides related historical papers, reports and books, ancient documents, and Internet materials to present the authenticity of Yusool as a martial art in the Joseon dynasty From a macro point of view, this was conducted as a specific research issue related to the beginning of Joseon judo and yusool and military martial arts from the military side of the middle Joseon period and the early period of the Korean Empire.*

Results: *After the Imjin Invasion, Joseon Yusool could provide its value as a cultural heritage in terms of the historical significance of Yusool from the Korean-Japanese military perspective, modern Joseon training, and the form of yusool values in the military aspect.*

Conclusion: *It was said that there was jujutsu in Joseon in 1880, and the representative figures were Jujutsu and Gyeongchuk, a military martial art from Chosun training centers such as Park Moo-gyeong, Im Eun-myeong, and Lee Gyu-wan. Lee Guk-do, the first instructor of the Shinheung Military Academy, taught close combat with Joseon jujutsu. This is because Jujutsu, viewed from the military perspective of Korea and Japan after the Imjin War, has a high value in the military aspect of the modern Joseon training course, and from the perspective of military martial arts. Joseon jujutsu could provide its value as a cultural heritage.*

[Keywords] ***Yusool, Martial Arts, Military Training, War, Value***

1. Introduction

Recently, through the Asia-Europe Conference(ASEM), Asia-Pacific Economic Cooperation Agency(APEC), the G20, and the Nuclear Security Summit and such large-scale international events were held in Korea, and the group has applied Korean martial arts and other sports security technology[1]. Throughout the meeting. In particular, it is important that military marital arts are intangible evidence representing the history of that era. Also, military martial arts play a role delivering a message of how we will interpret the thoughts and history of that era. Through this we can correctly recognize the history and clarify; And for the better future of our lives we can correct our wrongfully made subject-related consciousness. As such, today's military martial arts are improved and evolved by the start of the survival instincts of our ancestors

rather than being created and formed in an instant matter of time. In other words it was developed through the changes and evolution of the survival instincts of our people. They have been constantly trying to transform and through these changes and differentiation processes have led to founding of hand-to-hand combat military martial arts such as Subak, Gakryuk, Yusool, Swordsmanship and Gwanbeop(martial arts by fist). Joseon Yusool, a Korean military tactic, is a military martial arts and holds an intangible heritage value. In other words, from the middle of the Goreyo Dynasty period to the war of Imjin, these martial arts: Gakjuh, Gakryuk, Subak, have developed throughout time(Especially during Imjin war) but it lost its military martial value during modern Joseon Dynasty, which faced a difficult situation from a military perspective.

Then, as we look further into the research related to the Imjin war during the middle Joseon dynasty and the Yudo of Joseon from the military perspective of the late Joseon dynasty. According to[2], A Study on the War Status and Lessons of Imjinwaeran. [3]Internal Affairs and the Dispatch of Diplomatic Missions after Imjinwaeran -Focused on the Dispatch of the Response and Repatriation Mission, According to[4], A Study on a Threat to Sovereignty during the Period of Kojong(高宗)'s Reign, [5]Focused on the Analysis of the Meaning of Gwangmu(光武) and Cheyang(體養)(former treatise collection of, “Reinterpretation of Mu(武) Inherent in Gojong's Policy of National Prosperity and Military Power” According to[6], The Types and Operating System of Military Yusam(油衫) in the Joseon Dynasty, [7]The Organization and Operation of the Jeolla-do Naval Forces during Imjinwaeran, [8]A Study on Military Clothing in the Middle and Late Joseon Training camp(訓鍊都監), [9]War Information Just before Imjinwaeran and Joseon's Responsee, [10]A study on Yudo Languages during the Japanese Colonial Era[11] presented the historical roots of Joseon Yusool.

The preceding studies above explored the military aspect of the Imjinwaeran and the background of Japan’s military and its Yudo establishment in the late Joseon Dynasty. The research covered the areas of Japanese imperialism and Japanese ambitions to invade the Korean peninsula, but failed to make description of the purpose of the invasion and the process that was thoroughly prepared for hundreds of years after the Japanese invasion.

In addition, the research team thoroughly investigated the Joseon Yusool which were then used in hand-to-hand combat as a Joseon’s military martial art, and they also carefully investigated and recorded that though Japan had latest weapons, they were defeated by Joseon dynasty during the invasion after denying peace treaty through Joseon’s envoy

During the Imjin War period and also during the tour of the Japan’s army in the late Joseon period, they investigated Joseon Yusool, a martial art of hand-to-hand combat against the Japanese by Joseon soldiers. In other words, since there was no mentioning of Yusool during its usage in various wars such as the Battle of Bongo-dong and the Great Cheongsan-ri, our research team intended to clarify this.

Therefore, the purpose is to correct Yusool as a Joseon’s military martial art by reviewing and analyzing the meaning and its value of Yusool from the perspective of the modern military after the Japanese invasion of Korea.

2. Research Method

This research guideline is for the purpose of presenting the authenticity of Yusool as a Joseon’s military martial art by in-depth examination of the meaning and value of Yusool viewed from a modern military perspective after the Japanese invasion of Korea. In other words the research team investigated analyzed and discussed its relation in the scope of research through historical papers, reports, books, ancient documents and internet materials. From a macroscopic point of view, it was intended to proceed as a specific research task related to the beginning of Joseon Yudo, Yusool and military martial arts in the military aspect of the during middle of Joseon and the early Korean empire. The team discussed, analyzed and researched Yusool viewed from the military perspective of Korea and Japan after the Imjin war and its value of

Yusool from aspect of modern Joseon training regimen and military perspective. Therefore, the team presented the authenticity of the meaning and value of Yusool viewed from the modern military perspective after the Japanese invasion of Korea. Furthermore, Joseon Yusool could provide its value as a cultural heritage in terms of Joseon military martial arts.

3. Results

3.1. Historical significance of yusool from the Korean-Japanese military perspective after the imjin war

As it was seen by Kang Hang who became prisoner of war under the Japanese military during Jungyu war, the following article describing that the Joseon warrior was playing Gakryuk against Japanese warrior is as follows.

Records from《看羊錄》, during September 23, 1597 to May 19, 1960. How can one save a person since his life is considered light and rather regarded as dead when the Joseon man played Gakryuk against the Japanese[12].

《海遊錄》, It is certainly a matter of importance regarded by the military should that the men becomes of a rust after learning medicine and swordsmanship or even practicing Yusool to form a body similar to that of flying and attack others in harms way as if he is stabbing or striking. [13].

As such, it is noteworthy that the Joseon warriors are evaluated as they have superior skills than the Japanese warriors. In particular this record comes from the speculation of Shin Yu-han(申維翰) of Sukjong University who visited Japan in 1719 as a craftsman for envoy. In other words, it was same as "Joseon's Gakryuk". It is said that it expresses a combative technique in the battlefield simliar to Yusool in the same meaning as the lexical notation of Kang Hang.

Figure 1. Yusool fighting between Joseon envoy warriors and Japanese warriors(edo period: director of Koto university).

鶏を盗んで、町人と喧嘩をする朝鮮通信使

『朝鮮人来聘記』 京都大学 所蔵

<Figure 1> In the picture above it is written in derogatory words that hence the Japanese were defeated the Joseon warriors stole the chicken but there is something of an importance. In particular, it is shown that the arm of Japanese warrior is broken, one is down, and two other Japanese warriors are confronting against one Joseon warrior. The last picture shows the Joseon warrior hanging in the inner heel. Japanese warriors were not a match against to the Joseon warriors.

The following record is a report from the "Jongamungo", which describes the results of the Joseon warrior's unreasonable Yusool match that took place in Osaka on October 10, 1719.

Figure 2. Cover of 《宗家文庫》 Joseon envoy journal.

<Figure 2> It is a record of Joseon envoy journal 《宗家文庫》 at the Tsushima History and Folklore Museum, Japan, and it has written results of a Yusool match, like the aggression that took place in Osaka on October 10, 1719.

Figure 3. Joseon envoy journal 《宗家文庫》.

<Figure 3> This is a record from the Joseon envoy which were written results of the 10th match reported in writing to Toshio Suzuki, at Higashimachibukyo on October 20th left by Tsushima.

There were 15 games in the match. The winner of the first match was Bong-rip Park(朴奉立) against Pa-Romi Kim(金貝老未). The second match was won by Ji-myeong Kim(金之命) against Go-Up-Nam Choi(崔古邑男) as he also won against 5 others in the round of match.

However, he was defeated against Sun-Poong Go(高風善) while the winner won the victory by winning 6 people in a row and in particular, it was called “Erasing” in a rule book so that the winner did not retire and continued to compete until defeat.

On twelfth match, it was a round between Seok-Joong Lee(李石中) and Won-Seong Lee(金原成) and the winner was Seok-Joong Lee but these two were the people who were defeated by Sun-Poong Go.

This was a record from the Joseon envoy which were written results of the 10th match reported in writing to Toshio Suzuki, at Higashimachibukyo on October 20th left by Tsushima.

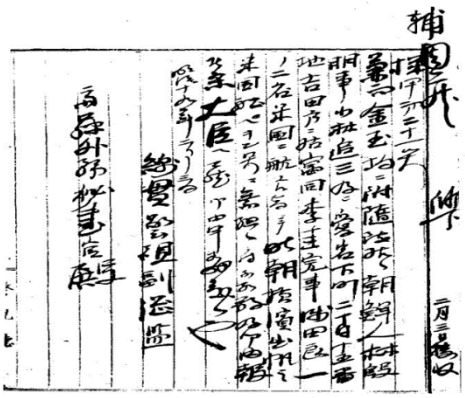
As such it is a record which Japanese government’s shogunate in the Edo period investigated and analyzed the military martial art of Joseon, Yusool. After seeing and thorough investigation the Japanese sought close-quarter combat to prepare for the modern military aspect.

3.2. Modern Joseon training and value in Yusool in aspect of the military

Although the intensity and scope of war vary there are understood within the scope of human cultural activities and never flow in one direction apart from people itself[14]. Olympics, which represented the ancient Greek civilizataion, had training regimen by means of survival and physical strength, such as wrestling, boxing, pancation, and chariot competitions to contest for physical condition and skills necessary for war or battle[15], the modern Joseon training is recorded that it was passed down to Eun-myeong Im, who was a master of Joseon Yusool, and to Gyu-wan Lee, a master of Taekkyeon. This is an excerpt from Jae-pil Seo's retrospective and modern history. After passing the state examination at the beginning of 1879, he was promoted as a government official and took the role of librarian(校書館副正字) in 1882(20th year under the rule of King Gojong). However, he was not able to practice such martial arts since he was a civil servant. On January 14th 1883(20th year rule under King Gojong),he was transferred to Seungjeongwon, and was abdicated by Min-yeong Lee on the same day due to illness. In early February 1883, he was seen by Seungmun-won government official, and on February 27th, he was assigned to the deputy of Kwon Ji-Seung-moon under the direction of Jo Lee as he received the special promotion to 6th grade trainer as a civil servant on march of the same year.

At this time, it is probable to assume that Joseon needed to cultivate the military at the recommendation of Ok-gyun Kim. However, Jae-pil Seo, who was not aware of the martial arts and his diesease, lead 14 Joseon warriors from training institutes in 1883 to learn the current state of Japan's new military and its system as a government funded foreign student. Which therefore Jae-pil Seo and his group, arrived in Japan in May of the same year and enrolled in Keio Uisuk(慶應義塾) for six months to experience the Japanese culture. The person responsible and in charge was Jae-pil Seo, and he completed the one-year course in Keio Uisuk in Janurary 1884(21st year of King Gojong). There was one important fact. Because Jae-pil Seo haven't learned martial arts, he practiced through his Korean classmates which he learned the difficult movements of Taekgyeon from Gyu-wan Lee and Jujitsu, strangling technique, and wrestling from Eun-myeong Im. In particular, Gyu-wan Lee was the father of Seon-gil Lee, who curated Joseon judo and Japanese judo from the 1930's to the 1940's. It is inferred that he learned Jujitsu, Taekkyeon, and Gakchuk, the martial arts of Joseon from his father when he was young. On the other hand, what he learned in Japan was a new military training such as gun swordsmanship, close-order drill, and bomb throwing at Toyama Army Sergeant School for 7 months from January 1884. There is a record written in an article published on February 28th 1884 by《current affairs newsletter (時事新報)》 founded by Yukichi Fukuzawa stated that there was no record of him appeared distracted during training, but rather stood as an exemplary according to《current affairs newsletter (時事新報)》, February 28, 1884[16]. "(At Toyama Sergeant's School) I cannot recall all the names of the nine people who were studying together back then, but the person I remember was Gyu-wan Lee, who was a relative of Young-hyu Park, from Gangwondo province as I dimly remember him throwing Japanese pupils in the air, it feels like yesterday to have such thought of him as a strong man. And for else, I could only gather the names of Mr. Jeong, Mr. Park. and Mr. Jo.

Figure 4. Yusool and gakchuk.



<Figure 4> On February 3rd, 1886, the document contains names of Eun-myeong Im and Gyu-wan Lee, who were the masters of Joseon Yusool and Gakchuk. The name of Ok-gyun Kim is also mentioned ([林殷明 such as 美國行 for 件], file number 機甲 Issue 21, publicized by 綿貫吉直(警視部總監), received by 齋藤修一郎(外務大臣 官房長), names 金玉均, 林殷明(小林追三), 李圭完(淺田良一).

Figure 5. Gyu-wan Lee, major general of the Korean empire(1905) 1899(2nd year under king Gwangmu's rule).

Figure 6. Jae-pil Seo in his youth, estimated to be in 1884.

The reason why nine people entered Hosan Sergeant School was because Ok-gyun Kim was allowed to be introduced by Yukichi Fukuzawa(The founder of Keio University) from Japan, and rest of them were also introduced to different school along with the greetings of Fukuzawa [17].

<Figure 6> In particular, this is Jae-pil Seo's retrospective. Mr. Im from the record above is also known as Eun-myeong Im of Joseon Yusoolist. In other words, even though Jae-pill Seo was just another relative of well known family of civil servant the fact that he learnt lessons of Joseon martial arts from Eun-myeong Im and Gyu-wan Lee regardless of identity and background impressed the students and became friends with him.

It is a well-known fact that he received the military training for about 7 months, he completed in June 1884, and got appointed as a librarian again while his stay in Japan in June of the same year. On June 20th, Jae-pil Seo and the cadets returning to Joseon requested king Gojong to establish a new military academy and suggested Jae-pil Seo to be appointed as an officer to create training bureau under the command of Byeongjo. However, even though he founded the training bureau with the

approval of Gojong, the death of Jae-pil Seo's adoptive mother, Mrs. Kim of Andong province, left him a tragedy and he had to resign from office.

Figure 7. The record in 1911 covering Geuk Lee having a role of an instructor of "Yusool" at shinheung military academy (source: public record of independence merit-gonghun center).

<Figure 7> On the other hand, Shinheung Military Academy and Yusool martial arts being applied for military purpose was originated from instructor Geuk Lee(李克)(instructor of swordsmanship and Yusool)[18]. At the time, the department for major classes included Bo(步), Gi(騎), Po(砲), and Chi(輜)'s drill book(操典), and guard service(內務令), study of maps(測圖學), training demonstration(訓練敎範), Garrison service order(衛戍服務令), army punishment decree(陸軍懲罰令), army criminal law(陸軍刑法), first aid medical training(救急醫療), gun swordsmanship(銃劍術), Yusool(柔術), swordsmanship(擊劍), strategy(戰略), tactics(戰術), construction studies(築城學), and organization studies(編制學). He taught with an emphasis on these studies.

[19]that the military organization is important in the efficiency of operation of organizing through martial arts training as a part of pursuing efficiency because of its uniqueness as a group that necessitates unified attitudes and performance of members of the military so that those educations included was required. As assumed, it is safe to say that Yusool already existed in Joseon in 1880. Representative figures were Moo-gyeong Park, Eun-myeong Im, <Figure 5> Gyu-wan Lee of those of whom considered as military martial artists of Joseon training center where Yusool and Gakchuk existed. Therefore, the training center in Joseon was established after the Imjin War, as HoonRyunDoGam also known as The Training Book(訓鍊都監) was published as part of military training organizational system. It was made as a dedicated government office for devoting martial talents exam, mastering the martial arts, and teaching the book of war. However, it was abolished in 1907 with the dissolution of the military and in 1906, already knowing this news in advance, Sang-Jae Lee of Walnam province took the role of instructing along with Soo-yong Na and Geun-soo Ryu of Yusool martial arts from organizing YMCA[20].

4. Conclusion

This study was researched in-depth for analysis of the meaning and value of Yusool viewed from the modern military aspect after the Japanese invasion of Korea. It is appeared in various documents that Yusool, a martial art of close-quarter combat against the Japanese by Joseon soldiers during Imjin War period, and during the tour of the Japanese army in the late Joseon Dynasty, was studied and investigated by the research team. According to this study, the existence of Yusool was appeared in Joseon

in 1880, and the representative figures include Moo-gyeong Park, Eun-myeong Im, Gyu-wan Lee and all others from Joseon training academy paved the way and proved that the Yusool and Gakchuk coexcisted during the era. In addition it was Yusool that a Joseon military martial artists and officers from Shinheung Military Academy used as a weapon of hand-to-hand combat in various wars such as Battle of Bongo-dong and the Great Cheongsan-ri.

Guk-do Lee, the first instructor of the Shinheung Military Academy, taught close-quarter combat with Joseon Yusool and this can lead to presume that Joseon Yusool can be viewed from the military perspective of Korea and Japan after the Imjin war that it has a high value in the military aspect of the modern Joseon training course; and in terms of military martial arts, Joseon Yusool could provide its value as a cultural heritage of Korea.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	IS	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑
Corresponding Author*	HC	-Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Co-Author	SP	-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 ☑

2021 6(2) 42-50
Submission: 2021/05/10, Peer review: 2021/05/20, Accepted: 2021/05/25, Published: 2021/06/30

International Journal of Martial Arts

Publisher: J-INSTITUTE
ISSN: 2423-835X

Website: www.j-institute.jp/martialarts/
Editor: martialarts@j-institute.jp

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dx.doi.org/10.22471/martialarts.2021.6.2.42

Comparison of Physique and Physical Fitness of TAEKWONDO Gyeorugi and WUSHU Santa Athletes

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Abstract

Purpose: *This study compared and analyzed the characteristics of physique and physical fitness factors between the two sports in order to provide useful information for the establishment of effective training plans for Taekwondo Gyeorugi athletes and Wushu Santa athletes.*

Methods: *The subjects of this study consisted of 14 Taekwondo Gyeorugi athletes in D Metropolitan City K University and 14 Wushu Santa athletes from D Team. Physical characteristics(height, weight, body fat percentage, BMI, lower extremities, thighs) and physical fitness factors(back muscular strength, sit-ups, repetitive jumps, standing long jump, Sargent jump, reaction time to sound/light, side step test, one-foot stand with closed eye, sit and reach, backward flexibility, anaerobic exercise capacity, isokinetic muscle strength of the knee joint) were measured to compare and analyze the differences between the two sports.*

Results: *As a result of the study, the physical characteristics of Taekwondo Gyeorugi athletes were statistically significantly higher than those of Wushu Santa athletes in left and right thigh circumferences. In terms of physical fitness, the Wushu Santa athletes were statistically significantly higher than those of Taekwondo Gyeorugi athletes in standing long jump and Sargent jump, which are evaluation items of power. In addition, Taekwondo Gyeorugi athletes were statistically significantly higher than Wushu Santa athletes in the evaluation item of balance. There was no statistically significant difference between the groups in the measurement result of anaerobic exercise capacity. Wushu Santa athletes were statistically significantly higher values of muscular strength and muscular strength per 1 kg of body weight in left and right extensors, and muscular strength and muscular strength per 1 kg of body weight in left flexors than the Taekwondo Gyeorugi athletes in the measurement result of isokinetic muscle strength of the knee joint.*

Conclusion: *In summarizing the results of this study, Wushu Santa athletes tended to have a higher tendency for most of the physical fitness factors except balance and flexibility compared to Taekwondo competition athletes, and in particular, muscular strength of extensors of lower extremity and power were higher. However, when comparative analysis based on the results of previous studies, it is considered that there will be some difficulties in generalizing the results of this study to the physical fitness of Taekwondo competition and Wushu Santa event athletes. In addition, it is thought that a follow-up study is needed to consider the competition rules for each sport and the technical characteristics of the players.*

[Keywords] ***Taekwondo, Wushu, Physique, Anaerobic Capacity, Isokinetic Muscular Strength of Knee Joint***

1. Introduction

Unlike the past martial arts taekwondo, which were trained to improve mental and physical training and self-defense self-defense, today's Taekwondo is subdivided into Gyeorugi, Poomsae, and demonstration sports. Popularization is rapidly progressing through sports organizations such as Kukkiwon, Korea Taekwondo Association, and World Taekwondo Federation[1]. In fact, the number of Taekwondo practitioners around the world exceeds tens

of millions of people, and 210 members of the World Taekwondo Federation are a sport that people from all over the world participate in. In the recent Poomsae event, the number of elite athletes is increasing rapidly as the attention of athletes from various countries has been focused on the Asian Games and World Championships[2][3][4]. Taekwondo competition is a typical sport in which the opponents are accurately hit by using various kicks and fist attacks for a limited time of 2 minutes and 3 rounds, and the score obtained is used to determine the win or loss. In the results of a number of previous studies, it is reported that agility, coordination, muscular endurance, and power are important in Taekwondo competitions, as the characteristics of the game that must score points through attack and defense using quick steps and deception and counterattack attacks[5][6]. Unlike in the past, as more scoring rules have been changed, the frequency of kicks to attack the face increases, so the flexibility and range of motion of the hip joint as well as the muscle function of the lower extremities are very important to the performance[2][7]. Wushu, an oriental martial art similar to the Taekwondo Gyeorugi event, refers to the traditional Chinese martial arts, and is a Chinese pronunciation of martial arts[6]. Wu-shu can be divided into two categories, the Touro as Poomsae of Taekwondo, and the Santa as Gyeorugi. Wushu, a demonstration event for the Beijing Olympics, has a two-minute and three-round match the same as Taekwondo, but the rules of the competition are quite different from those of the Taekwondo competition. In addition to the Taekwondo competition method, Wushu's Santa can score points by hitting opponents with punches and kicks, or by hitting opponents and pushing them out of the field. Looking at the results of previous studies related to the physical characteristics of the players in the Wushu Santa event, the strength for the defense against attacks by hitting and pushing out of the field, agility for quick direction change, dynamic visual acuity, and coordination, etc. are required[8], and low body fat mass, flexibility, leg muscular strength, isometric muscular strength, and anaerobic power of the upper limb are important[9]. A prior study examining the relationship between physical fitness factors for improving the performance of Wushu players was a comparative study[8] on the basic muscle function-oriented and professional physical characteristics of the national team Touro and Santa players. A study comparing the correlation between exercise passion, exercise immersion and exercise continuation[10] and a comparative study on the body composition and physical fitness level of general college students who are taking a practical training course with national team Wushu[11], however, there were very limited. If you look at the video of the Taekwondo Gyeorugi and the Wushu Santa event, you can see that the fitness level has an important influence on the performance. Unlike Taekwondo Gyeorugi, where the body and face are kicked around, the Wushu Santa event allows you to wear gloves and hit the face with a fist like a boxing match. In addition, since all techniques such as attacking and defending the whole body with a kicking technique, grabbing by hand, knocking down, and pushing are allowed, more various physical factors are required compared to Taekwondo Gyeorugi. The physical fitness level is closely related to the performance of all sports[12][13], the physical characteristics of each athlete and the physical fitness factors are highly related[14], and the improvement of muscle function considering the characteristics of the sport affects the performance of the exercise[15]. The purpose of this study is to analyze the characteristics of physique and physical fitness factors for the Taekwondo Gyeorugi athletes and the Wushu Santa athletes, and provide basic data for establishing an efficient training plan for each sport based on the results of previous studies.

2. Methods

2.1. Subjects

The subjects of this study were 14 Taekwondo Gyeorugi athletes from K University in D City and 14 athletes from the D team in the Wushu Santa event, and their physical characteristics are as shown in <Table 1>.

Table 1. Physical characteristics of study participants(n=26).

Items	Taekwondo (n=14)	Wushu sanda (n=14)	*t*	*p*
Career(years)	9.21±2.19	10.14±5.10	-.626	.537
Age(years)	19.93±1.00	25.29±5.61	-3.519	.002*
Height(cm)	179.48±4.91	175.48±5.37	2.057	.050
Weight(kg)	71.69±8.84	71.42±5.58	.095	.925
BMI(kg/m2)	22.20±2.11	23.21±1.65	-1.409	.171

Note: *p<.05.

2.2. Measurement items

Body composition tests of the study subjects and back muscular strength were measured for muscle strength evaluation, and sit-ups and repeated jumps for muscle endurance evaluation were measured at a local sports science center. In order to evaluate power, long jump and Sargent jump were measured, reaction time to sound and light stimulus were performed to evaluate response capacity, and side-step tests were performed to evaluate agility. For the evaluation of balance, the one-foot standing with closed eye were measured, and for the evaluation of flexibility, sit & reach and backward flexion tests were performed. To evaluate the anaerobic exercise capacity, the Wingate test was performed, and the isokinetic muscular strength of the knee joint was measured.

2.3. Statistical analysis

The data processing of this study was performed using the SPSS 22.0 statistical program to calculate the mean and standard deviation for each measurement item. Independent t-test was conducted to verify the difference by measurement items between Taekwondo Gyeorugi athletes and the Wushu athletes. The statistical significance level was set to p<.05.

3. Results

3.1. Comparison of physical characteristics

The physical characteristics of Taekwondo Gyeorugi and Wushu are as shown in <Table 2>.

Table 2. Comparison of physical characteristics.

Items	Taekwondo	Wushu Santa	*t*	*p*
Height(cm)	179.48±4.91	175.48±5.37	2.057	.050
Body weight(kg)	71.69±8.84	71.42±5.58	.095	.925
Lean body mass(kg)	62.61±7.08	61.81±5.04	.344	.733
Fat mass(kg)	9.08±2.53	9.61±3.91	-.430	.671
Percentage of body fat(%)	12.54±2.36	13.34±4.99	-.542	.593
BMI(kg/㎡)	22.20±2.11	23.21±1.65	-1.409	.171
Length of lower extremity(cm)	101.45±4.60	95.20±3.71	3.953	.001**
Sitting height(cm)	96.03±2.65	94.49±3.18	1.387	.178

Thigh circumference -left(cm)	58.64±3.40	55.97±3.03	2.196	.037*
Thigh circumference -right(cm)	58.71±3.21	56.13±2.90	2.239	.034*

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

3.2. Comparison of physical fitness

The difference in physical fitness factors between Taekwondo Gyeorugi players and Wushu players is as shown in <Table 3>.

Table 3. Comparison of physical fitness.

Items		Taekwondo	Wushu santa	*t*	*p*
Muscular strength	Back muscular strength (㎏)	144.50±15.51	147.29±27.05	-.334	.742
Muscular endurance	Sit-up(frequency)	52.36±7.37	55.29±5.41	-1.199	.242
	Repeated Jump (frequency)	51.00±4.44	51.79±6.77	-.363	.720
Power	Standing long jump(㎝)	235.03±12.24	246.39±15.78	-2.128	.044*
	Sarjent jump(㎝)	54.21±2.67	60.86±5.57	-4.024	.001**
Reacion time	Audio(sec)	0.244±0.027	0.233±0.039	.882	.387
	Video(sec)	0.257±0.030	0.253±0.039	1.785	.087
Agility	Side step test (frequencey)	53.21±4.35	51.64±4.31	.960	.346
Balance	One foot standing with closed eye(sec)	76.90±59.80	28.79±15.64	2.912	.007**
Flexibility	Sit and reach(cm)	16.39±5.10	14.89±4.63	.811	.425
	Backward flexibiliy	59.79±3.99	50.82±16.26	2.004	.064

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

3.3. Comparison of anaerobic capacity

The difference in anaerobic capacity between Taekwondo Gyeorugi athletes and Wushu athletes is as shown in <Table 4>.

Table 4. Comparison of anaerobic capacity.

Items	Taekwondo	Wushu sanda	*t*	*p*
Peak power(W)	590.29±115.44	624.67±72.47	-.944	.356
Peak power(W/kg)	8.20±0.77	8.76±0.94	-1.729	.096
Average power(W)	451.37±79.30	485.07±55.43	-1.303	.205
Total energy(J)	12740.36±2188.22	13960.93±1675.43	-1.657	.110
Peak drop(%)	56.74±9.92	51.87±7.30	1.480	.152

3.4. Results of isokinetic muscular strength in knee joint

The difference of isokinetic muscular strength in knee joint between Taekwondo Gyeorugi athletes and Wushu athletes is as shown in <Table 5>.

Table 5. Comparison of isokinetic muscular strength in knee joint.

Items	Taekwondo	Wushu sanda	*t*	*p*
Muscular strength of right extensors(%bw)	267.79±24.10	310.71±54.26	-2.706	.012*
Muscular strength of left extensors(%bw)	270.64±31.58	308.36±47.07	-2.490	.021*
Muscular strength of right extensors(nm)	191.07±18.51	221.79±40.87	-2.562	.017*
Muscular strength of left extensors(nm)	193.50±28.00	220.07±38.13	-2.102	.046*
Deficit of Muscular strength of left to right extensors	8.07±6.34	4.00±10.41	1.249	.225
Muscular strength of right flexors(%bw)	142.79±29.07	156.50±30.02	-1.228	.230
Muscular strength of left flexors(%bw)	143.21±21.29	161.57±22.51	-2.217	.036*
Muscular strength of right flexors(nm)	101.93±19.72	111.71±22.33	-1.229	.230
Muscular strength of left flexors(nm)	101.43±13.99	115.36±17.34	-2.339	.028*
Deficit of Muscular strength of left to right flexors	11.50±9.25	5.43±12.54	1.457	.158
Ratio of flexors to extensors (left)	52.93±6.28	53.21±8.27	-.103	.919
Ratio of flexors to extensors (right)	53.14±8.17	50.50±5.87	.983	.336

Note: *p<.05.

4. Discussion

This study analyzed the difference in physical fitness factors between the college Gyeorugi athletes and the Wushu Santa athletes. In the comparison of physique, Taekwondo Gyeorugi athletes were statistically significantly higher than Wushu Santa athletes in the length of lower limbs(p<.01), left thigh circumference(p<.05), and right thigh circumference(p<.05). This result is thought to be due to the revision of the Taekwondo Gyeorugi competition rules due to the introduction of the electronic protector, although consecutive kicks using fast steps and tricks were the main scoring method in the past. In this regard, it is believed that this is due to the result that the height and lower extremities have an important influence on the performance as the athletes with high heights operated the game in a way that touched the scored part rather than the strong hitting of the upper and torso using the lower extremities[3]. Although direct comparison is difficult due to the lack of previous research results for players in the Wushu Santa event, it was considered the increase of thigh circumference on the basis of the recent change of the Taekwondo Gyeorugi game style is changed from one foot in the center to the form of performing a continuous attack[2][7].

In the comparison of physical fitness factors, Wushu Santa athletes were statistically significantly higher than Taekwondo competition athletes in the standing long jump(p<.05) and Sargent jump(p<.01) as power item, and Taekwondo Gyeorugi players were statistically significantly higher(p<.01) than Wushu Santa players in one-foot standing with closed eye as

balance. In the results of basic physical fitness measurements[8] of national Wushu Santa athletes with similar physical conditions and ages, the back muscular strength was 192.94±19.81 kg, the sit & reach was 16.1±12.8 cm, the backward flexibility was 43.1±7.0 cm, and the one-foot standing with closed eyes was 16.1±12.8 sec. The back muscular strength was 127.38±12.27 kg, the sit-up was 62.33±5.14 frequency, the sit & reach was 27.17±4.28 cm, the Sargent jump was 63.77±3.80 cm, the side step test was 35.66±2.95 times, and the one-foot standing with closed eyes was 72.54±52.14 seconds(sec) with closed eyes in another previous study[11]. Therefore, in this study, Wushu Santa's back muscular strength was 147.29±27.05kg, sit and reach was 14.89±4.63cm, backward flexibility was 50.82±16.26cm, and one-foot stand with closed eyes were 28.79±15.64 sec), and these results showed a little difference as compared to previous studies' results. The peculiarity of the basic physical fitness factor is that the Wushu Santa athletes were significantly higher than the Taekwondo Gyeorugi athletes in the power evaluation items such as standing long jump and Sargent jump. These results can be seen in relation to the research results that the Wushu Santa player requires speed and power to hit the opponent for 2 minutes and 3 rotations, as suggested in the preceding study [8]. This can be related to the fact that the Sargent jump reported in the previous study[11] results was 63.77±3.80cm, which is very similar to the 60.86±5.57cm shown in this study. The fact that Taekwondo Gyeorugi athletes' balance ability evaluation item, the one-foot stand with closed eyes, was statistically significantly higher than that of Wushu Santa, indicating improved balance ability. The cause of these changes can be attributed to the change in the rules of the Taekwondo Gyeorugi and the demand for a continuous attack with one foot by utilizing the flexibility and balance ability of the hip joint, which is relatively more advantageous than the quick and powerful connection kick. These changes have also been suggested in previous studies[2][7][16].

In the comparison of anaerobic exercise capacity, there was no statistically significant difference between Taekwondo Gyeorugi athletes and Wushu Santa athletes. In the results of a previous study on the national athletes of the Wushu Santa event[8], the peak power per body weight was 13.63±1.06 W/kg, and the peak drop was reported as 60.46±3.56%, and this peak power per body weight was higher than as compared to 8.76±0.94 W/kg in this study. However, in peak drop, which shows resistance to fatigue, it was confirmed that the Wushu athletes participating in this study were 51.87±7.30 %, which was more excellent. In the results of previous studies[7], it was reported that the Wushu Touro athletes had superior anaerobic power compared to the Santa athletes, and this was reported to reflect the game characteristics for efficient physical consumption during the 2 minutes and 3 rounds[17]. These results indicate that there are not many elite athletes in the Wushu Santa event compared to the athletes in the Taekwondo competition, so even in most previous studies, the number of study participants was around 10, making it somewhat difficult to generalize to the physical characteristics of Wushu Santa athletes Is considered to be.

In comparison of the isokinetic muscular strength of the knee joint, left and right extensor muscular strength($p<.05$), left and right extensor muscular strength per body weight($p<.05$), left and right flexor muscular strength($p<.05$), and left and right flexor muscular strength per body weight($p<.05$), the Wushu Santa player was statistically significantly higher than the Taekwondo Gyeorugi player. These results are thought to reflect the characteristics of the Wushu Santa event. The difference is that in the Wushu Santa event, the attack type that strikes the opponent and pushes the opponent out of the field can lead to the development of isokinetic muscle function of the lower extremities, but the taekwondo competition relies on the touch method using foot technique. In particular, the back-retreat technique, which is reported to be used frequently by domestic athletes[18], is a foot technique that strikes the opponent using the sole of the foot while the knee joint is stretched and requires high muscle strength of the lower extremities. The basic physical fitness, anaerobic exercise capacity and isokinetic muscle function of Taekwondo Gyeorugi athletes in the results of this study were almost identical when compared with the results of a number of previous studies [19][20][21][22].

This study compared the physical fitness of Taekwondo Gyeorugi athletes and Wushu Santa athletes, but it is considered to be somewhat difficult to grasp the physical fitness characteristics of each sport because it showed a difference from the previous studies. However, the measurement results of isokinetic muscular function of knee joint are considered to reflect some of the sports specificity of Wushu Santa athletes, and can be used as basic data for further research.

5. Conclusion

This study compared and analyzed the characteristics of physique and physical fitness factors for 14 Taekwondo Gyeorugi athletes from K University in D City and 14 athletes from Wushu Santa in D Team, and intended to provide basic data for establishing training plans for each sport.

In the results of this study, in terms of physical characteristics, the length of lower limbs and left and right thigh circumference of Taekwondo Gyeorugi players were statistically significantly higher than those of Wushu Santa athletes.

In terms of physical fitness, the Wushu Santa athletes were statistically significantly higher than the Taekwondo Gyeorugi athletes in the standing long jump and the Sargent jump, which are the evaluation items of their power, and the Taekwondo Gyeorugi athletes were statistically significantly higher than the Wushu Santa athletes in one-foot stand with closed eyes as the balance evaluation item.

In the measurement result of anaerobic exercise capacity, statistical significance between groups could not be confirmed. In the measurement result of isokinetic muscular strength of knee joint, Wushu Santa athletes were statistically significantly higher than Taekwondo athletes in muscular strength and muscular strength per body weight of left and right extensors, and muscular strength and muscular strength per body weight of left and right flexors.

In summarizing the results of this study, Wushu Santa athletes tended to have a higher tendency for most of the physical fitness factors except balance and flexibility than the Taekwondo Gyeorugi athletes, and in particular, the muscular strength of lower limb extensor and power were higher. However, when compared and analyzed based on the results of previous studies, it is somewhat difficult to generalize the results of this study to the physical and fitness characteristics of athletes in Taekwondo Gyeorugi and Wushu Santa events, and a follow-up study that considers the competition rules for each sport and the technical characteristics of the athletes is considered to be necessary.

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Lead Author	CH	-Set of concepts ☑ -Design ☑ -Getting results ☑ -Analysis ☑
Corresponding Author*	JP	-Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Co-Author	KK	-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 ☑

2021 6(2) 51-61

Submission: 2021/05/10, Peer review: 2021/05/20, Accepted: 2021/05/25, Published: 2021/06/30

International Journal of Martial Arts

Publisher: J-INSTITUTE
ISSN: 2423-835X

Website: www.j-institute.jp/martialarts/
Editor: martialarts@j-institute.jp

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dx.doi.org/10.22471/martialarts.2021.6.2.51

Effect of Middle School Students' Participation in JUDO TRAINING on Social Development

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Abstract

Purpose: *The purpose of this study is to provide basic data that will help expand the base of Judo by analyzing the social process that adolescents who are entering puberty during the period of becoming an adult and are currently attending middle school to train their body by practicing judo.*

Method: *The subject of this study was to extract samples from Judo trainers and non-trainers at middle schools and various schools located across the country using cluster random sampling. Only valid samples were coded in accordance with the coding guidelines, except for responses that were deemed unreliable after the response was retrieved from the completed data. After individually inputting the encoded data into the computer, it was computerized according to the purpose of analysis using the statistical program SPSS Window 20.0 Version.*

Results: *As a result of the difference in Judo Training and sociality of middle school students according to demographic characteristics, the second year was higher than the third year in cooperation according to gender, and the lower rank was higher in cooperation. As a result of the correlation between Judo Training Participation and social development, training period showed a positive correlation with training frequency, and training frequency showed a negative correlation with compliance. As a result of the Participation in training on social development, compliance was found to have a negative effect on intensity, and autonomy was found to have a positive effect on duration.*

Conclusion: *As a result of a comprehensive analysis of the effects of Judo Training in middle school students on sociality, no significant difference was found in the family relationship and the results of comparing the personality characteristics and social differences between trainees and non-trainees according to demographic characteristics. However, in terms of gender, training groups showed significant differences in activity and dominance, unlike non-training groups. Based on these results, it is necessary to develop various programs that can be implemented in Judo gymnasiums for the development of social skills necessary for the growth period.*

[Keywords] ***Middle School Students, Martial Art, Judo Training, Participation, Sociality Development***

1. Introduction

Judo among Martial Arts sports can be said to be a great sport that develops both physical and mental aspects, and it is an exercise that can cultivate strong physical strength, morality, and social skills through perseverance and self-denial in the training process. Judo aims to create and enjoy the beauty of human beings who can properly adapt to various situations by harmonizing physical strength and spirit[1][2]. Especially in adolescence, sports activities affect physical, mental, social, psychological growth and personality development. Adolescents' physical activity is not just a game, but an opportunity of valuable learning and development. Therefore, the experience of physical activity in adolescence can be an opportunity to promote personal physical, mental, and social development

throughout life. Due to today's college entrance exam-oriented social environment, the aftermath is also affecting the school education and daily life of adolescents.

Selfishness and individualism are prevalent for reasons such as a decrease in family members due to a decrease in the fertility rate, excessive parental overprotection, and addiction to the Internet and computers. It is time to move away from this egocentric thinking and to understand and cooperate with others' positions[3].

Through physical activity, one experiences the socialization process by reconstructing one's experience and expressing one's will and feelings. Lee Y(2006) said that it provides the best means to learn the norms and roles played by experiencing sports activities[2]. Among physical activities, especially judo, develops further in the sense of "winning by conforming to the other's power," and is called a valid development of mind and body. The definition of Judo means that it can be applied not only to the technique of throwing and pressing, but also to all aspects of society[4]. In this respect, it can be evaluated positively in that it can cultivate comprehensive abilities in the middle school period, which is the period of social development. In addition, it is also an oriental concept of Martial Arts developed as a method of human cultivation that trains the body and cultivates the mind through attack and defense techniques. For this reason, learning offensive and defensive skills, manners and character education are positioned as one of the training objectives for forming social bonds[4][5].

Kim J(2019) showed that Judo had a higher influence on social development than taekwondo in a study on personality changes according to Martial Arts characteristics[6]. Kong S(2017) reported that in a study on personality characteristics centered on male Judo athletes, the longer the period of Judo Training, the more stable emotionally[7]. Judo Training may be presented in a way that can address the absence of various sports and sports activities due to the social constraints and environmental factors presented earlier. This is because judo can have a positive effect on the correct social development of adolescents and can play a role in physical training as well as mental and physical training. Therefore, the purpose of this study was to analyze the relationship between personality traits and social development of adolescents through Judo Training, to present the need for Judo Training to growing adolescents, and further to propose for activating empirical data accumulation and Participation in induction training by field leaders.

2. Research Method

The purpose of this study is to investigate the relationship between students' social development through Judo Training. As a research method to achieve this research purpose, it was composed of a research subject, a research tool, a research procedure, and a data processing method. Specific details on this are as follows**.**

2.1. Research subject

The subjects of this study were sampled using cluster random sampling from middle school students and non-trainers who are training in judo at middle schools and dojos located in metropolitan cities across the country as of 2020.

By subdividing each region, 210 judo trainees and 210 non-trainees were selected as the population and used for sampling. The general characteristics of the study subjects are as follows <Table 1>.

Table 1. General characteristics of research subjects.

Participation type			Frequency	Total	Participation type			Frequency	Total
Trainee	Sex	Male	110	210	Non-trainee	Sex	Male	110	210
		Female	100				Female	100	

	School year	Second grade	90	210		School year	Second grade	70	210
		Third grade	120				Third grade	140	
	Grade	High	100	210		Grade	High	100	210
		Middle	60				Middle	60	
		Low	50				Low	50	
	Family relations	Live with family	170	210		Family relations	Live with family	160	210
		Separation	20				Separation	15	
		Divorce	10				Divorce	20	
		Etc.	10				Etc.	15	

Specifically, looking at the demographic characteristics of the subjects of this study shown in <Table 1>, there were 110 male and 100 female trainees, and there were more third graders. In terms of grades, the number of respondents who answered 'high' was higher than 'middle' and 'low'. In the non-training group, there were more male students in that there were 110 male students and 100 female students, and the statistical distribution of trainees was similar in grade, grade, and family relationship.

As the sample size is the critical value of the number of samples required for model validation, the sample size can be considered suitable for examining the relationship between middle school students' Sociality Development through training.

2.2. Measurement tool

In this study, the survey method to investigate the relationship between the social development of middle school students through Judo Training is the questionnaire method. Among the tools that have already been used to verify the reliability and validity of the questionnaire in domestic and foreign previous studies, the method were re-quoted, modified, and supplemented to suit the variations of this study. The reconstructed questionnaire was used as a measurement tool after reviewing the suitability and applicability of the questionnaire through a cognitive test and a pilot test. The contents of this questionnaire are as follows.

2.2.1 Composition index of questionnaire

The composition of the questionnaire to be used in this study consisted of a total of 90 questions, including sociodemographic characteristics and Participation in Judo Training as an independent variable.

The composition index of the specific questionnaire are as follows <Table 2>.

Table 2. Composition index of questionnaire.

Classification	Composition index	Composition	Number of questions
Background variable	Sociodemographic characteristics	Age, participation, family relationship, etc.	5

Independent variable	Participation in judo training	Duration(more than 6 months), frequency (weekly training time), intensity(training intensity)	3
Dependent variable	Sociality development	Compliance, autonomy, diligence, cooperation	32
Total			90

2.2.3. Development of sociality

The sociality scale was modified and used for this study based on the questionnaires used in Sung G(2008)'s study on the perception and actual conditions of physical activity[8]. The composition of each item was used after verifying reliability and validity through a pilot test, and was constructed in the form of a 5-point Likert type.

Table 3. Analysis result of sociality development factors.

	Component			
	1	2	3	4
sb10	.946	.043	.113	-.110
sb11	.918	-.146	.146	-.067
sb16	.845	.040	.021	-.277
sb15	.806	-.050	.195	.205
sb13	.795	.207	.220	.223
sb14	.772	-.065	-.022	-.020
sc19	.504	.702	-.258	.425
sc17	-.788	.684	-.515	.361
sc21	-.732	.663	.196	.013
sc18	-.675	.660	-.589	.246
sc24	-.609	.612	-.161	.137
sc22	-.354	.599	.587	.144
sc20	-.093	.584	-.089	.002
sa2	.053	-.217	.866	.109
sa4	.403	-.245	.808	.050
sa5	-.171	.130	.799	.224
sa8	.355	-.040	.791	-.077
sa7	-.266	-.213	.777	-.105
sd30	-.087	.446	.224	.812
sd25	.263	-.594	-.004	.771
sd26	-.486	-.565	.335	.756
sd27	.308	.516	-.468	.721
sd31	.103	-.394	-.409	.720
sd32	-.050	.137	-.686	.682
sd28	.416	-.463	.477	.584
sd29	.211	-.201	-.128	.562
Cronbach'a	.768	.749	.945	.870
Eigenvalues	1.830	1.727	1.625	1.526
Dispersion(%)	16.637	15.699	14.770	13.873
Cumulative dispersion(%)	16.637	32.337	47.106	60.979

As for the reliability coefficients for each factor, the Cronbach'a value according to the internal agreement was Cronbach'a = .768 for the compliance factor, Cronbach'a = .749 for the autonomy factor, Cronbach'a = 945 for the diligence factor, and Cronbach'a = .870 for the cooperation factor. appeared to be reliable.

2.3. Data processing method

The analysis methods used in this study for data analysis were Frequency analysis, Fctor analysis, and Correlation analysis, and the significance level was set to p<.05%.

3. Research Results

The purpose of this study is to investigate the effects of middle school students' Participation in Judo Training on personality traits and Sociality Development, and to scientifically verify the hypotheses established based on the research model. That is, the results were extracted based on the relationship of personality traits according to the degree of Participation in Judo Training, and the impact on social development according to the degree of Participation in Judo Training.

3.1. The relationship between sociality development according to the degree of participation in judo training

The following <Table 4> is the result of analysis to find out the correlation between Participation in Judo Training(independent variable) and Sociality Development(dependent variable).

Table 4. Pearson's correlation analysis of judo training participation and sociability.

Classification	1	2	3	4	5	6	7
Term	1.000						
Frequency	.231**	1.000					
Intensity	-.017	-.030	1.000				
Compliance	-.081	-.397**	-.126	1.000			
Autonomy	.025	-.080	.082	.137**	1.000		
Diligence	.131	-.026	-.094	-.095	.652*	1.000	
Cooperation	.137	-.118	.145*	.178	.103	-.123	1.000

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

As shown in Table 4, the degree of training Participation and sociability were found to be partially correlated in each sub-factor. Training period, which is a sub-factor of Judo Training Participation degree, was found to have a positive correlation with training frequency(r=.231), and training frequency, a sub-factor of Judo Training Participation degree, was found to be positively related to compliance(r=.397). A negative correlation was found. Training intensity, which is a sub-factor of the degree of Participation in Judo Training, showed a positive correlation in cooperation(r=.145). Compliance, which is a sub-factor of sociality, was found to be positively correlated with independence(r=.137), and autonomy was found to be positively correlated with diligence(r=.652). On the other hand, there was no correlation between diligence and cooperation.

3.2. Effect of judo training participation on sociality development

In order to analyze the effect of middle school students' Participation in Judo Training on social development, the influence and relative contribution of the degree of training Participation set as an independent variable on sociality, a dependent variable, was verified in this study.

3.2.1. Multiple regression analysis on the effect of judo training participation on compliance

Table 5. Multiple regression analysis on the effect of the degree of participation in judo training on compliance.

Dependent variable	B	SE	β	t
(Constant)	3.306	.099		33.497
Term	-.099	.028	-.030	-.340
Frequency	-.194	.044	-.384	-4.395***
Intensity	-.022	.021	-.089	-1.026
	R^2=.166	F=7.485***		

Note: ***P<.001.

<Table 5> above is a multiple regression analysis to find out the effect of Participation in Judo Training on compliance, which is a sub-factor of sociality. According to the results of <Table 5>, it was found that sub-factors of Participation level, namely training period, training frequency, and training intensity, had a statistically significant effect on compliance with sub-factors of sociality at 0.1% level, and the level of Participation was 16.6 percent of the total parameters of compliance. Looking at the β value indicating the relative contribution of each of these variables, it was found to have a negative effect on the intensity(β=-.384).

3.2.2. Multiple regression analysis on the effect of Judo training participation on autonomy

Table 6. Multiple regression analysis on the effect of participation in judo training on autonomy.

Dependent variable	B	SE	*β*	*t*
(Constant)	3.303	.052		63.281
Term	.009	.017	1.043	11.556*
Frequency	-.028	.023	-.094	-1.198
Intensity	.012	.011	.084	1.107
	R^2=.115	F=2.898**		

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

<Table 6> above is a multiple regression analysis to find out the effect of the degree of Participation in Judo Training on autonomy, a sub-factor of sociality. According to the results in <Table 6>, sub-factors of the degree of Participation, namely, training period, training frequency, and training intensity, were found to have a statistically significant effect at the 1% level on autonomy, which is the sub-factor of sociality. The level of Participation was 11.5% of the explanation of the total variable of independence. Looking at the β value indicating the relative contribution of each of these variables, it was found that the period(β=1.043) had a positive effect.

3.2.3. Multiple regression analysis on the effect of participation in judo training on diligence

<Table 7> is a multiple regression analysis conducted to examine the effect of Participation in Judo Training on diligence, a sub-factor of sociality. According to the results of <Table 7>, it was found that sub-factors of Participation degree, namely training period, training frequency, and training intensity, had a statistically significant effect on diligence, a sub-factor of sociality, at 5% and 0.1% levels. The level of Participation was 47.7 percent of all variables of diligence. Looking at the β value indicating the relative contribution of each of these variables, it was found that the period(β = .146) and the intensity(β = .095) had a positive effect in the order.

Table 7. Multiple regression analysis on the effect of participation in judo training on diligence.

Dependent variable	B	SE	*β*	*t*
(Constant)	2.934	.073		40.011
Term	.039	.023	.146	1.739*
Frequency	-.022	.034	-.055	-.654
Intensity	-.018	.016	.095	5.897**
	R^2=.477	F=21.229***		

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

3.2.4. Multiple regression analysis on the effects of participation in judo training on cooperation

Table 8. Multiple regression analysis on the effects of participation in judo suhyeon on cooperation.

Dependent variable	B	SE	*β*	*t*
(Constant)	3.111	.089		34.822
Term	.054	.026	.157	2.066*
Frequency	-.078	.038	-.155	-2.055*
Intensity	-.031	.018	-.128	-1.735
	R^2=.285	F=3.614*		

Note: *P<.05.

<Table 8> is a multiple regression analysis performed to examine the effect of Participation in Judo Training on cooperation, a sub-factor of sociality. According to the results, the sub-factors of Participation degree, namely, training period, training frequency, and training intensity, had a statistically significant effect on cooperativity, which is a sub-factor of sociality, at the 5% level. The degree of Participation was 28.5 percent of the total number of variables in cooperation. When looking at the β value indicating the relative contribution of each of these variables, it was found to have an effect in the order of duration(β=.157) and frequency(β=-.155).

4. Discussion

The purpose of this study is to understand the relationship between personality characteristics and social development of elementary school students through Judo Training. To achieve this purpose, related hypotheses were established and analyzed according to scientific research methods and processing procedures, and results were derived accordingly. In this section, the discussion is based on the verified results.

4.1. Judo training of middle school students according to sociodemographic characteristics and differences in social development

The sub-factors of Sociality Development consisted of compliance, cooperation, sociability, and autonomy, and it was found that there was a partially significant difference in demographic characteristics. The results of comparing the training group and the non-training group are as follows.

First, as a result of examining the differences in the social development of judo practitioners according to demographic characteristics, it was found that there were partially significant differences in gender, grade, school performance, family relationship, training period, training frequency and training intensity.

Significant differences in sociality according to gender were found in diligence and cooperation, and males showed higher levels of diligence and females of cooperation. According to the results of Cho G(2017), an analysis of physical activity Participation and social development, and Moon J(2020), an analysis of the relationship between children's sports Participation and sociality, the experience of physical activity Participation is positive for the social development of boys and girls[9][10]. In this study, trainees participating in Judo Training showed higher scores in all factors of compliance, cooperation, sociability, and autonomy than non-trainees in the sociality sub-variables. In particular, among the sociality factors of this study, autonomy shows results consistent with the study of Moon J(2020), who reported that children participating in individual sports showed more independent attitude than group sports[10].

In terms of the difference in personality characteristics according to school grades, the top ranks were the highest in compliance, and the bottom ranks were the highest in cooperation. Regarding the difference in family relationship and sociality, the group of cohabitation with parents and etc. groups showed the highest in compliance, and the group of divorced parents showed the highest in autonomy. In cooperation, the group living with parents was the highest. Sociality is expressed through interaction between individuals or groups in interpersonal relationships, and positive social development helps to instill desirable character formation and correct human outlook in childhood, and to establish various friendships in school life. There was a significant difference in compliance with the difference in sociality according to the training period, and it was the highest for more than one year and less than three years. In the frequency of training, there was a significant difference in compliance, and the trainee group for 1 hour to less than 5 hours showed the highest.

In the study of personality formation and sociality according to the training period of Hapkido, significant differences were found in activity, dominance, equality, thoughtfulness, and sociality, and in Taekwondo training, there was a high difference in sociality, increasing the reliability of this study[11][12].

In terms of social differences depending on the intensity of training, the group with training intensity that of diligence and cooperation was the highest. In a study by Kim H(2003), autonomy was 6 months to less than 1 year, activity was less than 6 months, thoughtfulness was more than 1 year, and dominance was more than 6 months. was found to be high, which is partially consistent with the present study. In Kim W(2012)'s study of social formation factors and academic performance through physical activity of preschool children, the stronger the independence or rational tendency of children participating in organized physical activity, the greater the likelihood of participating in group sports [11][13].

Second, looking at the results of analysis to find out the differences in sociality of non-training groups according to demographic characteristics, there were significant differences in sociality according to gender in compliance. In compliance, females were higher than males, while significant differences were found in all sub-variables in social differences according to grade level. In compliance, autonomy, and diligence, the lower grades were higher than the upper grades, and in cooperation, the upper grades were slightly higher than the lower grades. There was a significant difference in compliance with social differences according to school grades, and among them, the middle class showed the highest.

Studies such as Kim J(2005) have shown that participants outperform nonparticipants in social development and that Participation in sports contributes to the development of human relationships among participants and plays a large role in self-discovery and development[14][15]. Also, it is consistent with the results of Chae J(2008) indicating that activity and dominance are improved through sports activities, supporting the results of this study[15].

4.2. The relationship between development of sociality according to the degree of participation in judo training

The degree of Participation in training, that is, Participation period, Participation frequency, and Participation intensity, was found to be partially correlated with each sub-factor of sociality. Training period, a sub-factor of the degree of Judo Training Participation, was found to have a positive

correlation with the training frequency, and training frequency, a sub-factor of the Judo Training Participation degree, was negatively correlated with compliance. In addition, training intensity, a sub-factor of the degree of Participation in Judo Training, showed a positive correlation in cooperation. Compliance, which is a sub-factor of sociality, was found to have a positive correlation with autonomy, and autonomy was found to have a positive correlation with diligence. On the other hand, there was no correlation between diligence and cooperation. The results of this study can be supported by the result of Han K(2001)'s study that the results of high-level meaningful differences in dominance and sociability compared to non-athletes are positive for sociality formation[16]. These results may be due to the reason that the value of the sport was sufficiently recognized as a Martial Arts sport, but the Judo Training processes, such as manners in the training ground, patience in the training process, moderation, humility, physical growth development, relieving academic-oriented stress, and mental purification, are consistent with Sociality Development in schools and peer groups.

4.3. Effect of judo training participation on social development

In order to analyze the effect of junior high school students' Participation in Judo Training on social development, looking at the effect on compliance, which is a sub-factor of sociality, it was found to have a negative effect on intensity. When looking at the effect on autonomy, it was found that the period had a positive effect, and when looking at the effect on the diligence, it was found that the period and intensity had a positive effect. When looking at the effect of Participation in Judo Training on cooperation, which is a sub-factor of sociality, it was found to have an effect in the order of negative in terms of duration and negative in frequency. In Lee S(2010)'s study, the degree of Participation in sports activities of middle school students partially affected the development of social skills. In particular, the frequency of Participation did not affect cooperation, autonomy, and sociability. appears to partially support the results of this study. Also, it was found that compliance did not have a significant effect on frequency and duration[17].

As a result of a comprehensive analysis of the effects of Judo Training in middle school students on sociality, no significant difference was found in the family relationship with the results of comparing the personality characteristics and social differences between trainees and non-trainees according to demographic characteristics. In this, the trainee group showed a significant difference in activity and dominance, unlike the non-trainee group. In the difference in sociality, the training group showed a significant difference in family relationship compared to the non-training group. In particular, it is thought that 2nd grade female students develop a leadership position in the group through Judo Training. In addition, judo trainees show significant differences from each factor of personality characteristics through training for more than 6 months, and through this, they have agile, diligent, active attitude and productive personality characteristics in everything, and the frequency of practicing for more than 1 hour every day. It is understood that they have an active personality trait and maintain smooth relationships with various people. In particular, a strong positive correlation was found in dominance, uniformity, and activity, and it is judged to be related to the development of children's personality through Judo Training to develop leadership skills by actively participating in group activities and being calm. On the other hand, in terms of factors affecting sociality, frequent practice showed a low negative correlation with compliance, which is different from the study shown in the study of social development of aikido practitioners studied by Seo M(2020)[18]. It is thought that a concrete comparison between current middle school students' awareness of social norms and responsible behavior in small classes is necessary. Similarly, Lee K(2010), who studied the personality characteristics of Martial Arts trainees comparing Hapkido and Taekwondo, showed that the student group was higher in activity and dominance, which are lower in personality characteristics than the non-trainee group, but there was no meaningful difference in masculinity and homogeneity [19]. Based on these results, it is necessary to develop various programs that can be implemented in judo gymnasiums for the development of social skills necessary for the growth period[20][21].

5. Conclusions and Suggestions

This study aims to provides basic data that will be helpful in expanding the base of Judo Training by analyzing the relationship between the development of personality education and the social process as well as training middle school students in childhood, an important period for personality formation, by practicing judo. As of 2020, the following results could be extracted as a result of surveying middle school students who are training in judo at middle schools or studio and non-trainers located in metropolitan cities across the country.

First, it was found that the personality characteristics of judo practitioners according to demographic characteristics were partially significantly different according to gender, grade, school performance, family relationship, training period, training frequency and training intensity.

Second, men were higher in gender-based diligence, women in cooperation, and second graders were higher than third graders in cooperation according to grade. In terms of school performance differences, compliance showed higher levels in the upper ranks and cooperation in the lower ranks. Regarding the difference in family relationship, the group living with parents showed higher social factors than non-trainees and children with unstable family relationships, and showed a significant difference in compliance in training period and training frequency.

Third, as a result of the correlation between Judo Training Participation and Sociality Development, it was found that there was a partial correlation. Training period was found to be positively correlated with training frequency, and training frequency was negatively correlated with compliance. In addition, autonomy was found to have a strong positive correlation in diligence. It is believed that the more responsibility is placed on one's actions, the more it is related to the diligence of everyday life.

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Author	YJ	-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 ☑

2021 6(2) 62-72
Submission: 2021/05/10, Peer review: 2021/05/20, Accepted: 2021/05/25, Published: 2021/06/30

International Journal of Martial Arts

Publisher: J-INSTITUTE
ISSN: 2423-835X

Website: www.j-institute.jp/martialarts/
Editor: martialarts@j-institute.jp

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dx.doi.org/10.22471/martialarts.2021.6.2.62

A Study on the Verification of Competency Management Factors of College TAEKWONDO Athletes and Strategies for Improving Performance

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Abstract

Purpose: *This study sought to conceptualize the components of the evaluation management for excellent college Taekwondo athletes and validate each component in detail. Furthermore, the purpose of this study is to, third, propose a strategy through the analysis of the importance of key management factors structuring the definition of the components.*

Method: *To achieve the purpose of the study, literature review, in-depth interviews, the Delphi analysis, and the AHP analysis were sequentially carried out.*

Results: *First, customized training and match strategies ought to be structured for each individual athlete. Furthermore, it is necessary to continuously share these with coaches, athletes, and parents, and create a flexible systematic training program which may be adjusted at any time according to the match performance.*

Second, it is necessary to introduce an active consulting program related to family life, school and team life, and interpersonal relationship, and also systematically introduce a program which enables the exchange of opinions by and between leaders, counselors, parents, and athletes.

Third, after retiring as a college student, the basic academic and curriculum learning management, on top of the Taekwondo match skills, one ought to be able to operate a program which may be consulted by and between the advising professor and the Taekwondo coach so that one can organize life independently.

Fourth, by classifying excellent athletes or athletes of high potential value, one needs to connect with the college headquarters to provide a sponsorship program to connect sponsors and sponsor organizations according to match skills and recent performance results, and also consider the career path for Taekwondo activities which can sustain match skills and athlete life as a matter of formal institutionalization.

Conclusion: *The athlete competency management evaluation scale developed with a focus on the college Taekwondo athletes may be utilized as the basic data for the college athletes to reach the national level of matching skills and also discover promising middle and high school students. Furthermore, academic and practical effects may be expected in that they will provide useful information for the follow-up researchers in the study of the field of Taekwondo match.*

[Keywords] ***Competency Management Factors, College, Taekwondo Athletes, Strategies for Improving, Performance***

1. Introduction

The positive image of sports athletes is continuously being utilized as a communications tool to facilitate consumption for and of companies, brands, and general products and services in the modern society. In particular, as for a representative marketing technique stressing it, sports sponsorship and sports athlete endorsement advertisements may be examined. Such forms of sports marketing are generally utilized to promote and advertise the brands created

by popular companies and organizations and the products and services produced, thereby projecting and selling the faithful and healthy images of excellent sports athletes onto their companies and their products and services. It is used as a method to promote and maximize profits[1]. Together with which, in the sports industry itself, the brand value of sports assets including sports events, leagues, and clubs is rapidly rising, and the efficient operation of sports organizations and athletes is in the spotlight as a special industry for the local communities, which seeks to create newly added value by utilizing the sports industry and sports.

Taekwondo, for which Korea has the status and privilege as its country of origin, is a sports event with excellent athlete resources and coaching manpower, and is also operated as a core event at the Olympic games. However, as the competition with other countries has intensified, it is difficult to ensure survival as an official sport in the Olympics if Taekwondo does not demonstrate excellent match skills as the country of origin for Taekwondo. Therefore, there is a demonstrated need for a strategy which may be executed by consolidating the athlete management strategy. Furthermore, a tool which can measure it by applying it to athletes is needed first. From this point of view, to enhance the match skills of Taekwondo, which is Korea's event of key competence, it is necessary to study the athlete competency management and match skills improvement strategy for college Taekwondo which harnesses and operates national level athletes.

Until now, various studies utilizing excellent sports athletes have been conducted. Studies conducted outside of the scope of training and coaching for the match skills improvement has primarily been conducted with a focus on the external images of sports followed[2][3][4][5][6].

The performance results of this study will be helpful for providing the basic data on the athlete management in order to help industrialize Taekwondo as a professional sport, whose popularization has been weak at best as a spectator sport relative to the rate of penetration. Therefore, in order to secure future talents for Taekwondo, who play an important role in the Grand Prix, World Athletic Competition, Asian Games, and the Olympic Games, a strategic competency management program for college Taekwondo athletes is needed.

Therefore, this study sought to conceptualize the evaluation management components of college Taekwondo's excellent athletes and validate each component in detail. Furthermore, the purpose of this study is to, third, propose a strategy through the analysis of the importance of key management factors structuring the definition of the components.

2. Research Method

2.1. Literature review

As for the literature search, the search method for each literature database was utilized to the extent possible. At which time, as for the literature search database, the National Assembly Library, Korean Studies Information Co., Ltd., and the EBSCO host where overseas academic search is available are planned for implementation. Furthermore, academic materials related to the domestic and foreign excellent athletes of college sports, dissertations, the Internet, specialized books, and newspaper articles were used.

2.2. In-depth interviews

2.2.1. Research participants

An expert council was formed to select research participants for the in-depth interviews. The expert council was consisted of a total of 7 members, including 2 professors majoring in Taekwondo, 1 professor majoring in sports coaching, 2 field coaches of Taekwondo, 1 Taekwondo match administrative expert, and 1 national athlete.

2.2.2. Survey tool

As for the in-depth interviews, a question guide was produced as a survey tool. The question guide was produced by a consultative body of experts based on the review of previous studies including the reference literature and data. A semi-structured in-depth interviews were conducted in this study based on the question guide[7].

2.2.3. Survey procedures

As for the in-depth interviews of this study, in-depth interview surveys were conducted with the following procedural issues in mind. First, as for the question guide, multi-directional validation was conducted in advance by discussing it with the expert council. Second, the in-depth interviews were conducted by visiting the research participants in person. Third, to naturally form a bond with the participants during the in-depth interviews, a light and simple story around the research topic was begun, and the interviews were conducted for 2-3 hours per session.

2.3. Delphi analytical technique

2.3.1. Research subject

Among the goals of this study, the two-step method for developing a strategic program is the Delphi analytical technique. The study subjects used for the Delphi analytical technique were applied in the same way as the research participant criteria for the in-depth interviews. However, for the effective processing of the Delphi analysis, the 30 subjects were selected including sports coaches and Taekwondo instructors.

2.3.2. Survey tool

2.3.2.1. Delphi: 1st

The 2nd Delphi survey was prepared and conducted by analyzing the open questionnaire responses collected for the preliminary survey utilizing the Delphi technique. A closed end type questionnaire for the 2nd survey of the Delphi technique was prepared in the form of a 5-point Likert scale.

2.3.2.2. Delphi: 2nd

The 3rd survey, which was conducted in the same manner as the 2nd Delphi survey, analyzed the response results of the 2nd survey, classified the items positively accepted by the research participants and those that did not, collected opinions, and reconfirmed the extent of the acceptance of the results.

2.3.2.3. Validity

As for the purpose of the item testing based on an open ended type questionnaire, the primary content validity was validated by using Patton's(1990) inductive category analytical procedures. To increase the reliability and validity of the results of the integrated analysis and the categorization of the responses, the expert council reviewed them repeatedly numerous times.

2.4. AHP analysis

2.4.1. Research subject

To apply the AHP analysis, in this study, respondents were formed with a focus on the stakeholders group. A total of 30 subjects were surveyed by using the judgment sampling method with a view to select a group which the researcher can access and which is determined to be a valid target as a sample.

2.4.2. Data analysis

As for the AHP analysis, a 9-point scale was used, and a pairwise comparisons were performed between each component which requires decision making. During the reliability analysis of the AHP method, the Consistency Ratio(CR) value, which is a method of measuring the extent of error in the individual evaluators' judgment, was calculated when the relative importance between each evaluation factor was evaluated. In this study, among the response data, only the responses with a CR value of 10% or less were used in the hierarchical analysis to enhance the reliability of the study.

3. Research Result and Discussion

3.1. Selection of the competency management items for athletes

The contents of <Table 1> were analyzed and organized via in-depth interviews and open ended type questionnaires with the expert group participating in the first stage of research on the detailed items of the college Taekwondo athletes' competency management. All were divided into 36 items. The experts presented that a specific management of training, match, daily life, and interpersonal relationship would be needed for a coach to manage college Taekwondo athletes.

Table 1. Exploration of the contents of the athlete competency management items.

Explored items
Do you decide daily, weekly, monthly, yearly training schedules in advance?
Do you discuss and decide the training schedule with the athlete?
Do you evaluate accurate performance of the training schedule?
Do you evaluate match performance after the training schedule?
Do you regularly adjust the training schedule according to the match performance?
Do you classify and carry out the trainings according to characteristics such as physical strength, skills, and tactics, etc.?
Do you regularly check on the athlete's personal life during the camp?
Do you regularly check on the athlete's intra-school relationship with classmates?
Do you understand the athlete's family and home environment?
Do you regularly consult with the athlete to understand the life of the athlete at home?
Do you consult with the athlete's parents and understand the athlete's growth process?
Do you frequently adjust the match strategy during matches?
Do you confirm the match strategy by discussing it with the athlete before the match?
Even if the match strategy is changed, is the athlete entrusted to decide on the execution?
Do you support the inspection of match related equipment, tools, etc.?
Do you check on the facilities and environment of the arena in advance?
Do you have a designated medical institution secured in case of injuries?
Do you carry out individual management consultations with a physician regarding the athlete's injuries?
Do you offer exercise programs for injury recovery?
Do you offer a counseling program for the injury recovery?
Do you carry out ongoing management consultations with parents about the injuries and recovery?
Do you continuously manage the athlete's match performance?
Do you coordinate with the athlete and parents for the matches and competitions of participation for the year in advance during the previous year?
Do you always adjust matches according to the athlete's physical strength and the level of completion of the training?
Is the athlete's match performance regularly promoted outside of the team?
Do you carry out regular consultations with parents regarding the costs and environmental assistance in order to conduct training and matches?
Do you frequently explore sponsors and institutions which match the team's capabilities and performance?
Are there separate sponsorship and support programs in operation for the non-excellent athletes and excellent athletes?
Do you carry out a regular consultation program with the athlete's sponsoring organization?
Do you frequently share the information with parents and athletes regarding the athlete sponsorship program?
Do you regularly check on the school and the athlete's curricular performance in the department?
Do you provide support for homework and review for poor grades for academic subjects?

Do you carry out academic counseling with the professor in charge of the subject in the department of affiliation?
Do you regularly conduct career counseling about the athlete's future?
Do you understand the athlete's special talents or usual hobbies beyond sports?
Are you directly involved in the post-retirement career program in connection with the college headquarters?

3.2. Categorization of the athlete's competency management items

The details of <Table 2> are the results of the categorization conducted via content validity and the gathering of expert opinions according to the characteristics of 36 items determined to be required for the competency management of college athletes. All 36 items may be classified into 8 categories according to their contents' characteristics. Each item was named by classifying into "training management, match management, grade management, injury management, daily life management, academic management, sponsorship management, and career path management".

Table 2. Categorization of the athlete's competency management items.

	Categorization
Training management	Do you decide daily, weekly, monthly, yearly training schedules in advance? Do you discuss and decide the training schedule with the athlete? Do you evaluate accurate performance of the training schedule? Do you evaluate match performance after the training schedule? Do you regularly adjust the training schedule according to the match performance? Do you classify and carry out the trainings into physical strength, skills, tactics, etc. according to characteristics such as goals and objectives?
Match management	Do you frequently adjust the match strategy during matches? Do you confirm the match strategy by discussing it with the athlete before the match? Even if the match strategy is changed, is the athlete entrusted to decide on the execution? Do you support the inspection of match related equipment, tools, etc.? Do you check on the facilities and environment of the arena in advance?
Grade management	Do you continuously manage the athlete's match performance? Do you coordinate with the athlete and parents for the matches and competitions of participation for the year in advance during the previous year? Do you always adjust matches according to the athlete's physical strength and the level of completion of the training? Is the athlete's match performance regularly promoted outside of the team?
Injury management	Do you have a designated medical institution secured in case of injuries? Do you carry out individual management consultations with a physician regarding the athlete's injuries? Do you offer exercise programs for injury recovery? Do you offer a counseling program for the injury recovery? Do you carry out ongoing management consultations with parents about the injuries and recovery?
Daily life management	Do you regularly check on the athlete's personal life during the camp? Do you regularly check on the athlete's intra-school relationship with classmates? Do you understand the athlete's family and home environment? Do you regularly consult with the athlete to understand the life of the athlete at home? Do you consult with the athlete's parents and understand the athlete's growth process?
Academic management	Do you regularly check on the school and the athlete's curricular performance in the department? Do you provide support for homework and review for poor grades for academic subjects? Do you carry out academic counseling with the professor in charge of the subject in the department of affiliation?
Sponsorship management	Is the athlete's match performance regularly promoted outside of the team? Do you carry out regular consultations with parents regarding the costs and environmental assistance in order to conduct training and matches? Do you frequently explore sponsors and institutions which match the team's capabilities and performance? Are there separate sponsorship and support programs in operation for the non-excellent athletes and excellent athletes? Do you carry out a regular consultation program with the athlete's sponsoring organization?

	Do you frequently share the information with parents and athletes regarding the athlete sponsorship program?
Career path management	Do you regularly conduct career counseling about the athlete's future? Do you understand the athlete's special talents or usual hobbies beyond sports? Are you directly involved in the post-retirement career program in connection with the college headquarters?

3. Validation of the priorities for items by category

The details of <Table 3> to <Table 10> are the results of examining the priorities for each item within the category according to the results of categorizing the competency management items for the college athletes. <Table 3> illustrates the priorities for each item within the training management category. The highest priority is "Do you decide the training schedule for daily, weekly, monthly, yearly, etc., in advance?" The lowest priority was "Do you discuss and decide the training schedule with the athlete?"

Table 3. Priorities of the training management items.

Training management items	Priorities
Do you decide daily, weekly, monthly, yearly training schedules in advance?	1
Do you discuss and decide the training schedule with the athlete?	6
Do you evaluate accurate performance of the training schedule?	2
Do you evaluate match performance after the training schedule?	4
Do you regularly adjust the training schedule according to the match performance?	5
Do you classify and carry out the trainings according to characteristics such as physical strength, skills, and tactics, etc.?	3

<Table 4> illustrates the priorities for each item within the match management category. The highest priority was "Do you confirm the match strategy by discussing it with the athlete before the match?" The lowest priority was "Even if the match strategy is changed, is the athlete entrusted to decide on the execution?"

Table 4. Priorities of the match management items.

Match management items	Priorities
Do you frequently adjust the match strategy during matches?	2
Do you confirm the match strategy by discussing it with the athlete before the match?	1
Even if the match strategy is changed, is the athlete entrusted to decide on the execution?	5
Do you support the inspection of match related equipment, tools, etc.?	3
Do you check on the facilities and environment of the arena in advance?	4

<Table 5> illustrates the priorities for each item within the grade management category. The highest priority was "Do you always adjust matches according to the athlete's physical strength and the level of completion of the training?" The lowest priority was "Is the athlete's match performance regularly promoted outside of the team?"

Table 5. Priority of the grade management items.

Grade management items	Priorities
Do you continuously manage the athlete's match performance?	3
Do you coordinate with the athlete and parents for the matches and competitions of participation for the year in advance during the previous year?	2
Do you always adjust matches according to the athlete's physical strength and the level of completion of the training?	1
Is the athlete's match performance regularly promoted outside of the team?	4

<Table 6> illustrates the priorities for each item within the injury management category. The highest priority was “Do you offer exercise programs for injury recovery?” The lowest priority was “Do you have a designated medical institution secured in case of injuries?”

Table 6. Priorities of the injury management items.

Injury management items	Priorities
Do you have a designated medical institution secured in case of injuries?	5
Do you carry out individual management consultations with a physician regarding the athlete's injuries?	4
Do you offer exercise programs for injury recovery?	1
Do you offer a counseling program for the injury recovery?	3
Do you carry out ongoing management consultations with parents about the injuries and recovery?	2

<Table 7> illustrates the priorities for each item within the life management category. The highest priority was “Do you understand the athlete's family and home environment?” The lowest priority was “Do you consult with the athlete's parents and understand the athlete's growth process?”

Table 7. Priorities of the life management items.

Daily life management items	Priorities
Do you regularly check on the athlete's personal life during the camp?	2
Do you regularly check on the athlete's intra-school relationship with classmates?	3
Do you understand the athlete's family and home environment?	1
Do you regularly consult with the athlete to understand the life of the athlete at home?	4
Do you consult with the athlete's parents and understand the athlete's growth process?	5

<Table 8> illustrates the priorities for each item within the academic management category. The highest priority was “Do you carry out academic counseling with the professor in charge of the subject in the department of affiliation?” The lowest priority was “Do you regularly check on the school and the athlete's curricular performance in the department?"

Table 8. Priorities of the academic management items.

Academic management items	Priorities
Do you regularly check on the school and the athlete's curricular performance in the department?	2
Do you provide support for homework and review for poor grades for academic subjects?	3
Do you carry out academic counseling with the professor in charge of the subject in the department of affiliation?	1

<Table 9> illustrates the priorities for each item within the sponsorship management category. The highest priority was “Do you carry out regular consultations with parents regarding the costs and environmental assistance in order to conduct training and matches?” The lowest priority was “Do you frequently explore sponsors and institutions which match the team’s capabilities and performance?”

Table 9. Priorities of the sponsorship management items.

Sponsorship management items	Priorities
Is the athlete's match performance regularly promoted outside of the team?	4
Do you carry out regular consultations with parents regarding the costs and environmental assistance in order to conduct training and matches?	1
Do you frequently explore sponsors and institutions which match the team’s capabilities and performance?	2
Are there separate sponsorship and support programs in operation for the non-excellent athletes and	6

excellent athletes?	
Do you carry out a regular consultation program with the athlete's sponsoring organization?	5
Do you frequently share the information with parents and athletes regarding the athlete sponsorship program?	3

<Table 10> illustrates the priorities for each item within the career management category. The highest priority was “Do you regularly conduct career counseling about the athlete’s future?” The lowest priority was “Do you understand the athlete's special talents or usual hobbies beyond sports?”

Table 10. Priorities of the career path management items.

Career path management items	Priorities
Do you regularly conduct career counseling about the athlete’s future?	1
Do you understand the athlete's special talents or usual hobbies beyond sports?	2
Are you directly involved in the post-retirement career program in connection with the college headquarters?	3

<Table 11> illustrates the overall priorities for each category according to the results of categorizing the competency management items for the college athletes. The highest priority was “training management,” and the lowest was “career management."

Table 11. Overall priorities of the competency management categories

Categories	Priorities
Training management	1
Match management	2
Grade management	6
Injury management	4
Daily life management	3
Academic management	5
Sponsorship management	7
Career path management	8

3.3. Strategies and directions for the improvement of match skills as per the athlete's competency management program

According to the results of categorizing the competency management items for the college Taekwondo athletes, overall, each priority by category based on the 1st priority training management, match management, grade management, daily life management, injury management, academic management, grade management, sponsorship management, and career path were analyzed in terms of their level of importance. According to which, the opinion that even the college athletes ought to prioritize match skills for the events of their own sports is gathered.

The basic daily life management and academic management, as a college student, must be carried out based on the match skills, and in parallel with the match skills management and academic management, the basic competency of the athletes must be secured, following which the environmental support and sponsorship to continue them are required without exception for regardless whether they are college athletes or amateurs as a matter of the result derived.

As a basic study of categorizing and scaling the competency management items for the college Taekwondo athletes, the match skills improvement strategies based on the competency management scale for the Taekwondo athletes which may be presented based on the results of this study are as follows.

First, the customized training and match strategies ought to be structured for each athlete individually. Furthermore, it is necessary to continuously share them with coaches, athletes,

and parents, and also create a flexible systematic training program which may be adjusted at any time according to the match results.

Second, it is necessary to introduce a proactive consulting program related to family life, school, team life, and interpersonal relationship, and also systematically introduce a program which enables the exchange of opinions by and between coaches, counselors, parents, and athletes.

Third, as college students, following retirement, they must be able to operate a program negotiable for and between their advising professors and Taekwondo instructors, on top of the Taekwondo match skills, as well as the basic academic and curriculum learning management so that they can structure their daily lives independently.

Fourth, by classifying the excellent athletes or the athletes of high potential value, they need to formally institutionalize connecting with the college headquarters to provide a sponsorship program considering the career path within Taekwondo activities which connects sponsors and sponsor organizations according to the match skills and recent results, and which can also sustain the match skills and athlete life.

This is supported by the research results showing that sports players with a high level of self-management have effective positive perceptions of sports emotions and show significant performance in performance)[8]. In addition, it is related to the previous research that suggests that the image of the athlete, the sponsor organization, and the image of the participating sports can be identified, thereby increasing the value of the athlete and the event, suggesting the importance of managing the athlete's competency[9]. Moreover, the importance of competency management of college sports players is further supported by the research result that it is necessary to support future activity programs of athletes by nurturing counselors or professional coordinators who will be in charge of career development and career transition support programs for retired athletes[10]. In particular, according to the results of a study that revealed that self-management of taekwondo players is an important factor influencing performance, it is very important to manage the time at university with excellent performance[11][12][13][14][15][16].

In the background in which the program above is proposed, is the purpose of realizing the value of sustainability focused on the Taekwondo match and the match skills of Taekwondo athletes. Most important for the coaches and athletes is the sustainability of Taekwondo in order to continue as a profession and as a sport which the general public watch and enjoy. The marketability of Taekwondo and sports is ultimately manifested by the athletes' excellent match skills. Therefore, a systematic management of the college Taekwondo athletes equipped with the highest match skills is very needed. Therefore, based on the results of this study, it is necessary to continue the study for each specific event in detail moving forward.

Centered on the expected results of this study, there are various basic data which may be acquired for Taekwondo and the sports of the Republic of Korea. The competency management program for college athletes, which are developed in the future, may be upgraded and applied for the national athletes as well. Furthermore, college teams with excellent Taekwondo athletes would be able to utilize Taekwondo, a sport beloved by Korean people, as an effective tool for the college publicity and communications based on the brand value and the image the excellent Taekwondo athletes carry.

4. Conclusion and Recommendation

In the previous studies, the management of college sports athletes focused on improving the match skills. However, it may be pointed out as an issue that the endeavors to further develop and commercialize college sports athletes with excellent competencies from a long-term and macro perspective for the promotion of the development of the sports industry are yet inadequate. That is, this study seeks to promote the strategic development as a sports business model

based on Taekwondo from a macroscopic perspective. Furthermore, from a microscopic point of view, it is meaningful in that the evaluation components which can systematically practice the college Taekwondo athletes' competency management can be developed. The athlete competency management evaluation scale developed with a focus on the college Taekwondo athletes may also be utilized as the basic data for the college athletes to reach the national level for their match skills, and also discover promising middle and high school students. Furthermore, academic and practical effects may also be expected in that they will provide useful information for the subsequent researchers in the study of the field of Taekwondo match. They may be utilized as the basic data for securing excellent Taekwondo athletes in preparations for the 2024 Summer Olympic Games following the 2020 Tokyo Summer Olympic Games. They may also be utilized as the basic data for developing programs for the popularization of Taekwondo as a viewing sport and match focused on the college teams.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Author	DK	-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 ☑

6.2. Funding agency

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea(NRF-2018S1A5B5A07074160).

2021 6(2) 73-83
Submission: 2021/05/10, Peer review: 2021/05/20, Accepted: 2021/05/25, Published: 2021/06/30

International Journal of Martial Arts

Publisher: J-INSTITUTE
ISSN: 2423-835X

Website: www.j-institute.jp/martialarts/
Editor: martialarts@j-institute.jp

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dx.doi.org/10.22471/martialarts.2021.6.2.73

Analysis of the Kinetic Difference of DOLGAECHAGI Between Taekwondo Kyorugi Players and Demonstrators

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Abstract

Purpose: *The purpose of this study is to provide the basic data for the appropriate technique performance by analyzing and presenting the differences in and among the major kinematic factors of Taekwondo's Dolgaechagi movements between Taekwondo Kyorugi planers and the members of the demonstration team.*

Method: *As for the subjects of this study, from among the Taekwondo players attending the Taekwondo Department of K University, 5 Kyorugi players and 5 demonstrators, among the Kyorugi players, who have entered the national team selection process and the demonstration team of the selection process. Prior to entering the experiment, a consent was secured from each subject, while the experiment implementation procedures were explained, and the kinetic data were collected by using 8 high speed digital cameras.*

Results: *As for the time required for the situation(P2), the time required for the demonstration team was greater than that of the Kyorugi players, and there was a statistically significant difference($p<.05$). As for the center of mass up and down(Z) movement displacement, in E3, the demonstrators turned out to be higher than the Kyorugi players, and there was a statistically significant difference($p<.05$). In E4, the demonstrators turned out to be higher than the Kyorugi players, and there was a statistically significant difference($p<.05$). The difference of the hip joint's angle turned out to be higher in E4 for the Kyorugi players than the demonstrators($p<.05$), and there was a statistically significant difference($p<.05$).*

Conclusion: *As a result of the experiment, to improve the level of completion of the Dolgaechagi kick, the demonstrator needs to jump high from and above the ground and also have the sports ability in the jumping state for the accurate movement, and at the time of executing the Dolgaechagi kick, in using the force for the ankle and knee joints, he or she turned out to execute the Dolgaechagi movement after bending the hip joint to the maximum. Kyorugi players need low and prompt sports ability since they strike the target by relying on fast rotations from the groun, and at the time of executing the Dolgaechagi kick, rather than using the force of the ankle and knee joints, they turned out to execute the Dolgaechagi movement without a maximum bend for the hip joint's angle as they strike the target by relying on fast rotations.In order to efficiently perform kicks based on such results, the Kyorugi players need a training by using fast rotations on the ground, and the demonstrators need strength and flexibility trainings in making jumps high on the ground.*

[Keywords] ***Taekwondo, Dolgaechagi, Kinetic, TaekwondoKyorugi Players, Taekwondo Demonstration***

1. Introduction

Taekwondo is largely divided into Kyorugi, Poomsae, and Demonstration. Among which, as for the Taekwondo Kyorugi, it began when the Korea Taekwondo Association joined the Korea Sports & Olympic Committee in 1962, and international competitions started following the establishment of the World Taekwondo Federation in 1972, which was also approved by the IOC in 1980[1][2].

Basically, Taekwondo Kyorugi uses fists and feet to execute attacks, while the kicking attack techniques are an important part of determining victory or defeat. As for the kicks, flexibility, agility, strength, balance, and timing, etc., have become important factors[3].

The representative kicking techniques primarily used for the Taekwondo Kyorugi matchs are front kick, back kick, Huryochagi, axe kick, and Dollyochagi[4]. Following the introduction of the differentiated scoring system, warning measures were strengthened against passive match operation behaviors which might influence the winning or losing decisions depending on whether aggressive attacks are made. Consequently, the number of attacks is rapidly increasing. The players participating in Taekwondo matches require relentless physical strength during the matches, and a difference in kicking skills and physical strength from against their opponents[5]. Furthermore, the Taekwondo Kyorugi's scoring method has been reduced to the size of the arena following the revision of the match rules. An additional scoring system is applied according to the technique, whereby 1 point is given for scoring with a fist when striking the trunk, 2 points for kicking in a straight attack, and 4 points for kicks by rotation. When striking the face, 3 points are given for kicking by general attack, and 4 points for kicks by rotation techniques. In addition, 1 point is given to the opponent player since the player during the match receives a 1 point deduction[6].

Taekwondo demonstration may be said to be a comprehensive technical expression which illustrates the entirety of Taekwondo. That is, it may be said that it is an expression of the comprehensive techniques of Taekwondo portrayed over short period of time by comprising the basic movements, Poomsae, Kyorugi, Breaking, Self-Defense, Taekwondo gymnastics, and special techniques and stunts, etc., which form Taekwondo[7]. Such Taekwondo demonstration has been widely accepted as a cultural product of Korea alongside the globalization of Taekwondo, and it is another fact that the field of demonstration players is growing as many demonstration matchs are held in recent years[8]. Currently, the forms of Taekwondo demonstration have undergone a transitional phase which overhauled the boundaries of the existing demonstration methods, and have also been established as a variety of performances by combining external factors including various music, acting, and B-boying with basic demonstration styles[9][10].

Included among the Taekwondo applied kick techniques are back kick, Narae kick, reverse Huryochagi, and Dolgaechagi. Among which, the Dolgaechagi technique is the Dollyochagi's applied technique, which is a high-level skill capable of scoring high points by making bold moves that accurately aim the timing according to the opponent's movements and using the rotational force to reverse the body while running[11]. According to analysis of the details of the Taekwondo competitions during the 2008 Beijing Summer Olympics, female players scored 50% with the Dolgaechagi, and according to, the analytical result for the kicking techniques before and after the introduction of the differentiated scoring system, at the finals of the National College Taekwon Do Competition in 2002 and the National College Taekwon Do Competition in 2010, in the case male players, the frequency of the Dolgaechagi ranged from 11 times(or 4.0% of the validity) to 26 times(or 10.9% of the validity), whereas in the case of female players, the frequency increased from 4 times(or 1.4% of the validity) to 21 times(or 9.9%). As for the frequency of the attack points, in the case of male players, the scoring frequency increased from 1 time(or 4.3% of the validity) to 9 times(or 20.9% of the validity)[11][12][13][14]. In the Taekwondo demonstration, the most difficult skill among the brilliant technical breaking is the rotation kicks, and it is difficult to acquire the skill as it is fancy. In particular, since it has a complex technical system which requires one to execute a turn and a kick with a single leap, understanding the correct technique is essential[15].

In the previous study of Taekwondo Dolgaechagi movement, [16]comparatively analyzed the center of mass and lower extremity segments during the Taekwondo Dolgaechagi movements between an excellent group of players and a group of non-excellent players. Such results were reported to be a major factor in performing fast and high impact Dolgaecahgi kicks. [17]Conducted a research analysis concerning the center of mass displacement and velocity during the kicking movement, and also reported that excellent players turned out to be faster than the

non-excellent players. [18]Reported that it is important to quickly reach the ground from above the ground and change direction, increase the momentum through the ground reaction, and apply the accurate and powerful strikes when performing Dolgaechagi kick.

As such, preceding studies for the technical improvement have been actively carried out,, and important kinematic factors have been identified, while various solutions for problems have also been presented. However, the preceding studies were conducted concerning the excellent and non-excellent athletes of the Kyorugi player groups, and have focused on the research analysis for the Kyorugi part only. While Kyorugi players and demonstrators apply the same kick, yet the Kyorugi players have the Dolgaechagi to score against the opponents in a match, and the demonstrators have the Dolgaechagi kicks used to earn breaking points in breaking competitions. As such, it is determined that it will be a very meaningful study to uncover the causes of various ground and air movements between Dolgae-kicks having different characteristics. Therefore, the purpose of this study is to provide the basic data for the technical performance by comparatively analyzing and presenting the differences across major kinematic factors in the leaping phase, flight phase, and finally striking phase for the Kyorugi athletes and demonstrators.

2. Research Method

2.1. Subjects

As for the subjects of this study, from among the Taekwondo players attending the Taekwondo Department of K University, 5 Kyorugi players and 5 demonstrators, among the Kyorugi players, who have entered the national team selection process and the demonstration team of the selection process. After the purpose and procedures of the experiment were explained, the experiment was conducted after they voluntarily signed the consent forms. The special characteristics of the subjects are illustrated in <Table 1>.

Table 1. Participants characteristic(N =10).

N	Age	Height	Weight	Career
Taekwondo kyorugi(5)	20.00±1.00	172.20±5.76	69.04±6.47	9.20±0.83
Taekwondo demonstra(5)	20.80±1.92	171.60±3.28	63.66±7.47	9.00±3.39

2.2. Measuring tools

The measuring tools and analysis equipment used in this study are as shown in <Table 2>.

Table 2. Measuring tools.

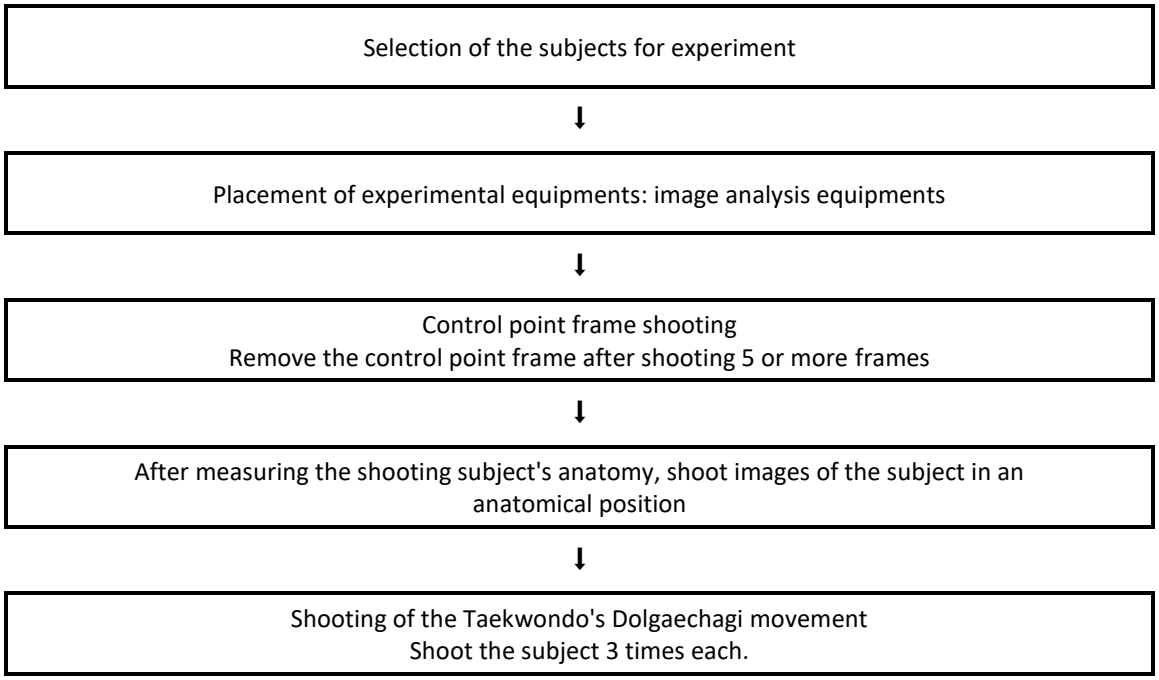
Instrument	Model	Company	Technique
Camera	Motionmaster100	VISOL	3D motion capture
Soft ware	KWON3D	VISOL	Analyze process
IN BODY	570	InBody	Body measurement
Trigger master	TM-0014	VISOL	Save & compatible

2.3. Experimental procedure

In this study, the purpose of research and precautions were explained and provided before the experiment. After measuring the subjects' body with In-body 570 Korea, warm-up exercises

were carried out for 15 minutes in the lab environment of the kinematics laboratory, following which the Dolgaechagi movements was sufficiently practiced. The height of the target during the Dolgaechagi movement was carried out with the subjects' chest area. An adequate space was secured to perform the experiment, and 8 high speed digital cameras(Motion master 100) were installed at 45° front and rear, and left and right, at the intervals of 5m from the location where the subjects performed the movement, while the cameras' shooting velocity was set to 100 frames/sec, and the shutter speed was set to 1/250 sec, respectively. Before proceeding with the experiment, the control point frame was shot for 2 seconds then removed to set the 3 dimensional space coordinates. For the digitization, subjects wore only black tights, and 32 reflective markers were attached to the segmental surface and joint points to enable the cameras to recognize them. The Dolgaechagi movement was performed 3 times by each subject, among which, the movements determined to be most accurate and complete were selected and analyzed.

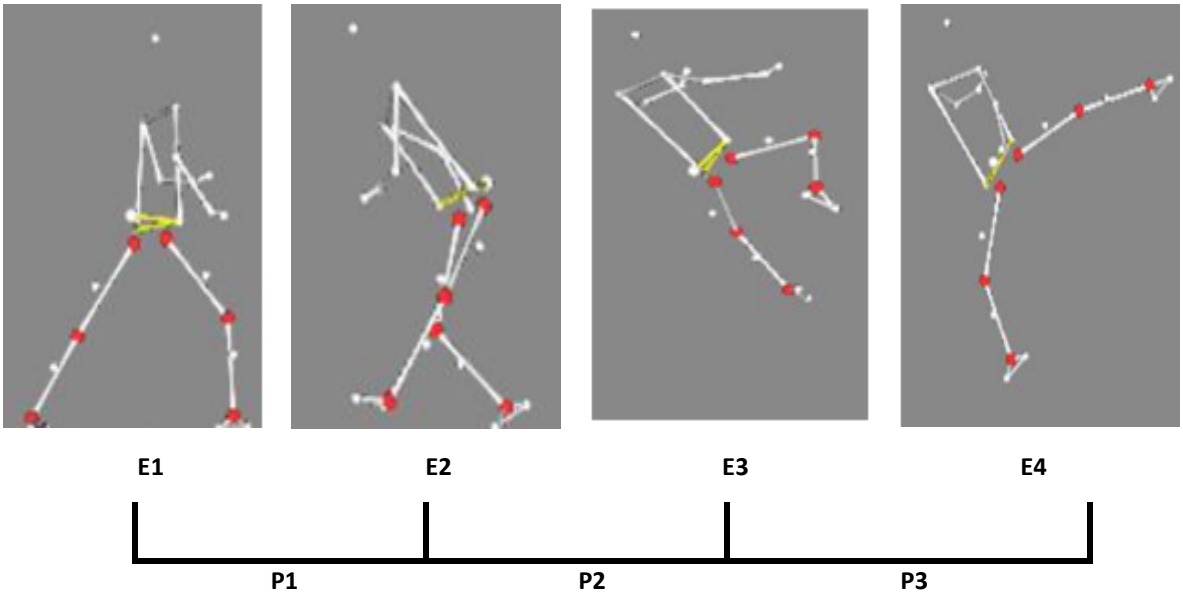
Figure 1. Experimental procedure.



2.3. Analysis events

The Dolgaechag kick was set to a total of three phases and four events, each of which is defined as <Figure 2>.

Figure 2. 4 Event and 3 phases.



2.4. Date processing

The statistical processing of this study used Excel 2018 to calculate the mean and standard deviation(M±SD) and statistical programs(SPSS 22.0, SPSS Inc., Chicago, IL, USA) to verify the differences in kinematic variables of the dolgaechagi. Shapiro-Wilk verification was per-formed to verify the normality of the collected data, and independent t-test and Mann-Whitney U test were performed to analyze the effect on kinematic parameters of the dolgaechagi of the Kyorugi athletes and demonstrators[19]. The significance level of all statistics is set to α=.05.

3. Result & Conclusion

3.1. Time variable analysis

The result of the analysis of the time taken for each group is as in <Table 3>.

Table 3. Lead time by each phase(unit: sec).

	Taekwondo kyorugi	Taekwondo demonstrators	*t/Z*	*p*
P1§	0.30±0.05	0.37±0.04	-2.242	.055
P2§	0.32±0.03	0.41±0.08	-2.418	.042*
P3§	0.17±0.05	0.13±0.05	.220	.220

Note: Mean±SD, §: Independent t-test, p-value: *p<.05.

As for the time required for the situation(P1), the demonstration team turned out to have a greater time than the Kyorugi players, yet there was no statistically significant difference. As for the time required for the situation(P2), the time required for the demonstration team was greater than that of the Kyorugi players, and there was a statistically significant difference(p<.05). The time required for the situation(P3) was higher for the Kyorugi players than in the demonstration team, yet there was no statistically significant difference. Examining the total execution time for each situation of the Dolgaechagi, it was confirmed that the Kyorugi players posted 0.79 sec, while the demonstration team posted 0.91 sec, which was faster than the demonstration team, and there was also a significant difference especially in the P2 situation.

Such result was yielded because in the P2 situation, the Kyorugi players struck the target by rotating at a faster velocity on the ground than the demonstrators. Since the demonstrators jumped higher than the fast rotation on the ground and struck the target with a more accurate movement, the time required for the P2 situation was postponed than the Kyorugi players. Therefore, it is an important factor for the Kyorugi players to quickly implement the movement on the ground, and the demonstration team ought to also recognize that it is an important factor to implement the movement to jump high on the ground. During the actual match, both groups should focus on the rotation training during the Dolgaechagi movement, and during the rotation training, reported that the Kyorugi players strike the target in a short period of time by rapidly increasing the rotation on the ground during the Dolgaechagi movement, which may be seen as a result resembling this study[11][20]. Furthermore, reported that it is important to strike the center of mass when one is at the highest position possible with a view to have a long flight toward improving the level of completion for the Dolgaechagi movement of the demonstrator[21]. Reported that when the quantity of rotation increases during the spin kicks of Taekwondo demonstrations(540D, 720D, 900D), the COM reaches the maximum height then lands, and performing spin kicks at the highest COM is the success factor.Therefore, it is determined that the Kyorugi players need to train fast on the ground, and the demonstrator members will benefit from training rotation movements with accuracy and height for their performance improvement.

3.2. Body center displacenment

The results of the analysis of the body center displacement of dolgaechagi are as shown in <Table 4>. As a result of conducting a comparative analysis of left and right(X) and front and rear(Y) displacements of the center of mass during the Taekwondo's Dolgaechagi movement, there was no significant difference.As for the center of mass up and down(Z) movement displacement, in E3, the demonstrators turned out to be higher than the Kyorugi players, and there was a statistically significant difference($p<.05$). In E4, the demonstrators turned out to be higher than the Kyorugi players, and there was a statistically significant difference($p<.05$). In E1 and E2, there was a numerical difference between the demonstrators and the Kyorugi players, yet there was no statistically significant difference.In this connection, reported that in order to raise the center of gravity during the Taekwondo kicking movements, the height of the knee joint of the crossing leg increases, and hence, it affects the high striking point and strong striking force[23]. Reported that, when examining the study between the excellent group and the non-excellent group for the demonstrators, a high flight affects the strikes in the E3 and E4 sections until the strikes are made, and also reported that the center of mass strikes only with accurate movements at the vertically(z axis) highest point. In the study of the Kyorugi players, reported that the target is struck by moving the body rapidly from the ground to striking the target[11][21][24][25][26]. Reported that the reverse rotational Dolgaechagi is an important success factor for performing at the maximum height of the COM[27]. As a result of this study, the result of the comparative analysis of the center of mass displacement during the Taekwondo's Dolgaechagi movement turned out to be similar to the result of the previous paper, and it seems that the Dolgaechagi movement of the Kyorugi players is intended to rotate quickly on the ground to accurately strike the target with the striking distance. It is also determined that the demonstrators are intended to perform the correct Dolgaecahgi movement with a high leap in the vertical(Z-axis) direction.

Table 4. Center of mass(unit: com).

		Group	Mean±SD	*t/Z*	*p*
X	E1§	Taekwondo kyorugi	0.48±0.15	0.539	.605
		Taekwondo demonstrators	0.44±0.03		

	E2§	Taekwondo kyorugi	0.44±0.10	-0.313	.754
		Taekwondo demonstrators	0.42±0.05		
	E3§	Taekwondo kyorugi	0.45±0.05	0.678	.517
		Taekwondo demonstrators	0.41±0.10		
	E4§	Taekwondo kyorugi	0.46±0.05	0.675	.519
		Taekwondo demonstrators	0.42±0.12		
Y	E1§	Taekwondo kyorugi	1.57±0.12	-0.249	.809
		Taekwondo demonstrators	1.59±0.04		
	E2§	Taekwondo kyorugi	1.35±0.41	-0.229	.824
		Taekwondo demonstrators	1.37±0.14		
	E3§	Taekwondo kyorugi	1.05±0.42	-3.663	.006*
		Taekwondo demonstrators	1.20±0.08		
	E4§	Taekwondo kyorugi	0.90±0.08	-3.910	.004*
		Taekwondo demonstrators	1.15±0.11		
Z	E1§	Taekwondo kyorugi	0.91±0.04	0.376	.717
		Taekwondo demonstrators	0.90±0.04		
	E2§	Taekwondo kyorugi	0.94±0.02	2.026	.077
		Taekwondo demonstrators	0.88±0.06		
	E3§	Taekwondo kyorugi	1.16±0.04	-2.667	.028*
		Taekwondo demonstrators	1.33±0.14		
	E4§	Taekwondo kyorugi	1.06±0.05	-2.835	.022*
		Taekwondo demonstrators	1.28±0.16		

Note: Mean±SD, §: Independent t-test, p-value: *p<.05.

3.3. Analysis of the angles of lower extremities

The result of the analysis of change of thejoint angle for dolgaechagi are as shown in <Table 5>.The difference of the hip joint's angle turned out to be higher in E4 for the Kyorugi players than the demonstrators(p<.05), and there was a statistically significant difference(p<.05).In E1, E2, and E3, there was a numerical difference between the demonstrators and the Kyorugi players, yet there was no statistically significant difference.A previous study conducted by reported that the hip joint angle was greater in the group of excellent athletes[28]. In a previous study by,it was reported that the movement was performed with the thigh close to the trunk from the start of the next movement, and influence will be made on the efficient movement[29]. Such a result indicate that, during the Taekwondo's Dolgaechagi movement, the demonstrator performs the motion with a high jump in the E4 section on the left side of the hip joint, and hence, after undergoing the process of taking off the left foot from the ground, the angle is smaller in the part striking the target in the E4 section on the left side of the hip joint. It is determined that the angle at the impact part of striking the target is higher in the process of rotating faster than the process of taking off from the ground.There was no significant difference between the two groups in the E1, E2, E3, and E4 sections when examining the knee joint angle during the Taekwondo's Dolgaechagi movement. Examining the previous studies, and reported that, as an analysis of the groups of excellent players and non-excellent players, the knee joint showed a larger angle than the non-excellent athlete when the kicking foot took off from the ground as soon as the Dolgaechagi movement began excluding the impact section[11][30][31]. In this study, it is determined that this is the result achieved since the height of the target and the striking distance between the groups are the same for the Kyorugi players

and the demonstrators.When examining the angle of the ankle joint during the Taekwondo's Dolgaechagi movement, there was no significant difference between the two groups in the E1, E2, E3, and E4 sections, and at the moment the Dolgaechagi movement began, the angular difference was shown in the left foot, which provides the rotation force. Reported that, as a result of the comparative analysis of the Kyorugi players against the excellent and non-excellent athletes, there was no significant difference in the moment the kicking foot from the ankle joint took off from the ground, yet showed the largest angular difference, and a similar result came about for this study[11]. Such a result, as with the knee joint, is determined to be caused by the same height and striking distance of the target.

Table 5. Lower limb joint angle(unit: deg).

			Group	Mean±SD	*t/Z*	*p*
Hip	E1	R§	Taekwondo kyorugi	103.37±7.33	-0.308	.766
			Taekwondo demonstrators	105.49±13.53		
		L§	Taekwondo kyorugi	114.41±12.80	-0.421	.685
			Taekwondo demonstrators	117.23±7.82		
	E2	R§	Taekwondo kyorugi	116.00±2.47	1.085	.309
			Taekwondo demonstrators	109.51±13.13		
		L§	Taekwondo kyorugi	104.68±3.21	1.623	.143
			Taekwondo demonstrators	97.08±9.96		
	E3	R§	Taekwondo kyorugi	103.70±10.57	1.522	.167
			Taekwondo demonstrators	94.93±7.37		
		L§	Taekwondo kyorugi	122.90±21.17	2.090	.070
			Taekwondo demonstrators	100.63±10.93		
	E4	R§	Taekwondo kyorugi	79.29±6.89	-0.609	.560
			Taekwondo demonstrators	82.53±9.70		
		L§	Taekwondo kyorugi	105.59±10.83	-2.627	.030*
			Taekwondo demonstrators	90.77±6.48		
Knee	E1	R§	Taekwondo kyorugi	135.46±11.46	-1.478	.178
			Taekwondo demonstrators	145.86±10.79		
		L§	Taekwondo kyorugi	146.73±10.82	-0.853	.418
			Taekwondo demonstrators	153.33±13.49		
	E2	R§	Taekwondo kyorugi	142.76±6.48	1.790	.111
			Taekwondo demonstrators	129.44±15.32		
		L§	Taekwondo kyorugi	162.62±7.60	1.043	.328
			Taekwondo demonstrators	156.89±9.65		
	E3	R§	Taekwondo kyorugi	81.61±13.28	-0.946	.372
			Taekwondo demonstrators	92.89±23.12		
		L§	Taekwondo kyorugi	124.73±10.17	0.437	.674
			Taekwondo demonstrators	122.47±5.49		
	E4	R	Taekwondo kyorugi	79.29±6.89	0.461	.657
			Taekwondo demonstrators	82.53±9.69		
		L§	Taekwondo kyorugi	105.59±10.83	1.745	.119
			Taekwondo demonstrators	90.76±6.48		
Ankle	E1	R§	Taekwondo kyorugi	94.99±3.92	-0.203	.844
			Taekwondo demonstrators	95.53±4.36		

		L§	Taekwondo kyorugi	90.49±10.73	-1.149	.251
			Taekwondo demonstrators	82.87±8.96		
	E2	R§	Taekwondo kyorugi	99.44±4.20	-1.085	.101
			Taekwondo demonstrators	89.03±11.82		
		L§	Taekwondo kyorugi	119.07±10.27	-1.623	.119
			Taekwondo demonstrators	109.07±7.65		
	E3	R§	Taekwondo kyorugi	133.17±9.80	-1.357	.212
			Taekwondo demonstrators	141.71±10.11		
		L§	Taekwondo kyorugi	120.85±2.41	1.267	.241
			Taekwondo demonstrators	117.97±4.49		
	E4	R§	Taekwondo kyorugi	134.73±8.36	-0.884	.402
			Taekwondo demonstrators	138.27±3.17		
		L§	Taekwondo kyorugi	99.46±18.39	-1.158	.280
			Taekwondo demonstrators	112.80±18.04		

Note: Mean±SD, §: Independent t-test, p-value: *p<.05.

4. Conclusion

Gathering and examining the results of this study all together, it turned out that the time required for the Kyorugi players to perform the Taekwondo's Dolgaechagi movement was shorter than that of the demonstrators, and such result indicated that the Kyorugi players required shorter time to score in a sparring match situation against the opponent. The demonstrators showed higher than the Kyorugi players in the vertical(Z axis) of the center of mass, and such a result indicates that, the demonstrators require the sports ability in the state of flight to perform an accurate movement and the high jumping movement, while the Kyorugi players require a low and prompt sports ability to rotate fast on the ground and strike the target. The angular difference of the hip joint turned out to be higher for the Kyorugi players relative to the demonstrator, and such a result indicates that, in order for the demonstrators to jump high in the vertical section in order to strike the target, and in using the force from the left ankle and knee joints, the movement of folding the hip joint, and hence, the angle will be reduced, and the Kyorugi players will not need to reduce the hip joint's angle in order to rely on the rotation to strike the target rather than using the force of the ankle and knee joints. In order to efficiently perform kicks based on such results, the Kyorugi players need a training by using fast rotations on the ground, and the demonstrators need strength and flexibility trainings in making jumps high on the ground. In the future studies, it would be necessary to analyze the movements between groups in the actual match situations and also conduct a technical research to identify and understand the characteristics of weight and weight division during the Dolgaechagi movement, which will significantly contribute to understanding the characteristics of Dolgaechagi for each Taekwondo event and improving the performance.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	DK	-Set of concepts☑ -Design ☑ -Getting results ☑ -Analysis ☑
Corresponding Author*	BH	-Make a significant contribution to collection ☑ -Final approval of the paper ☑ -Corresponding ☑ -Play a decisive role in modification ☑
Co-Author	HY	-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 ☑