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## The Influence of Experiential Marketing of JUDO Gym on Exercise Participation: The Verification of Mediation Effect of Experiential Satisfaction

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### Abstract

*The purpose of this study was to influence of experiential marketing of Judo gym on experiential marketing and exercise participation and this study aims at providing fundamental data and information on Judo gym academy by studying what effects of experiential marketing on experiential satisfaction and exercise participation.*

*The survey was done through 270 copies and excluding 22 copies ran an analysis on the remaining 248(91.9%) copies. After question investigating the data which is collected used IBM SPSS statistics 21 and IBM AMOS 21 program, frequency analysis was used in order to acquire demographic characteristics. Exploratory factor analysis and confirmatory factor analysis, convergent validity, discriminant validity, Cronbach's  $\alpha$  were used in order to verify experiential marketing, experiential satisfaction and exercise participation, and correlation analysis, path analysis through Structural Equation Model(SEM), mediation effect analysis by Sobel test.*

*The result of this study were as follows. First, experiential marketing of Judo gym showed(+) effects on experiential satisfaction. Second, experiential marketing of Judo gym showed(+) effects on exercise participation. Third, experiential satisfaction showed(+) effects on exercise participation. Forth, experiential satisfaction showed mediation effect on experiential marketing of Judo gym and exercise participation.*

*Therefore, Judo gym should actively use experiential marketing activities. So you will have to work to increase your membership.*

**[Keywords]** *Judo Gym, Experiential Marketing, Experiential Satisfaction, Exercise Participation, Mediation Effect*

## 1. Introduction

### 1.1. The necessity & purpose of the research

Starting with the gold medal at the 1981 World Championships, Korea's Judo is leading the way in promoting national prestige by consistently winning medals at various international competitions[1]. At the recent 2018 Jakarta-Palembang Asian Games, Korea's Judo also did very well as an elite sport, winning four gold, six silver, and two bronze medals.

Currently, Korea's sports system is divided into sports for all(for leisure and exercise) and professional sports to foster professional athletes. Judo is also divided into these same categories, and Judo as a professional sport is highly regarded both domestically and internationally with excellent performance as mentioned above. However, Judo as sports for all is shunned by the public as people are relatively uninterested due to the mistaken perception that it is a sport that only certain athletes with excellent physical ability do, even though it is a sport that helps improve their physical function and build personality and mental training.

The number of registered Judo gym increased to 716 since the 1988 Seoul Olympics along with the booming sports facility businesses[2]. However, the increased leisure time, coupled with economic growth, has given people a desire to participate in various sports activities, thus providing an opportunity for those who trained in Judo to flee to other sports, eventually reducing the number of Judo gyms registered with the Korea Judo Association to 432 in 2014[3].

On the other hand, the number of Taekwondo gyms is 11,272, accounting for 20.9% of the total sports facilities, and is still increasing every year[3]. This suggests the need for a new marketing strategy to break away from the preconceived notion that only those who have good physical condition and certain athletes can enjoy Judo, encourage those who practice Judo to keep it going, and attract new members. Therefore, it should be recognized that the marketing methods used by existing Judo gyms are no longer expected to attract new members and that more effective and practical marketing methods should be explored in order to revitalize Judo gyms. It is time to pay attention to the marketing that can enhance consumers satisfaction through emotional and sensuous experiences[4].

Experiential marketing, a marketing method considering consumers' senses, is the concept that sales or images of the company and the brand improves when consumers are provided with memorable experiences by comprehensively using five experience factors such as emotion, sense, perception, relationship, and behavior[5]. In other words, it is a marketing strategy that stimulates consumers' emotional side to comprehensively combine the empirical and psychological aspects of touch, smell, hearing, and vision[6].

Research related to experiential marketing has been studied in various fields including theme parks, cosmetics brands, fairs, restaurants[7][6][8][9] and proves that it has positive effects.

Meanwhile, Look at preceding studies. The relationship among satisfaction and favorability on the quality of service of Judo gyms[2], the relationship among satisfaction and willingness to revisit the gyms according to the leadership types of Judo coaches[10]. In addition, study for the purpose of Judo training and the ways to revitalize Judo gyms through environmental, physical, and mental factors of Judo trainees[11], and a study to find ways to operate Judo gyms through the trainees' satisfaction with the programs and facilities[12]. As such, most of the research so far have been limited to studies on programs, services, leadership, and environmental factors of trainees, and there is no research on satisfaction and exercise participation through experiential marketing.

In the case of Judo, the relationship and emotional aspects of trainees are more important than other sports because coaches and trainees have to hold each others' uniform and physical contact is involved. Therefore, experiential marketing, a marketing technique that stimulates consumers' emotional side, will not only increase the satisfaction of existing and new trainees but also encourage them to continuously practice the sport.

Therefore, this research is aimed at empirically identifying the impact of the experiential marketing of Judo gyms on the satisfaction and participation of trainees and examines the effectiveness and feasibility of the practical application of the experiential marketing in Judo gyms. In addition, it intends to lay the foundation for the popularization of Judo by seeking ways to efficiently operate Judo gyms.

## **1.2. Research hypothesis**

The hypothesis of this study was set up for the verification of causality between factors, and all the hypotheses were carefully examined based on proven prior research and set up as follows.

### **1.2.1. The relationship between experiential marketing and satisfaction**

While traditional marketing has recognized a consumer as a person who makes decisions based on one's reason and promoted and advertised products around the convenience and functions, experiential marketing is a marketing method that considers a potential consumer to be a rational but also emotional individual, developing and presenting a number of programs that can actually be remembered for long through experience[13].

In a study on the relationship between experiential marketing, satisfaction, behavioral loyalty, and purchase intention in the marine leisure industry, researcher said that experiential marketing had a significant impact on satisfaction, but it could result in conflicting results depending on how the experiential marketing program is organized and provided[14]. In a study done by researcher on the experiential marketing in a dive resort it also shows a positive impact on satisfaction and can promote a long term relationships[15]. In addition, report in research study that experiences in marine leisure sports in the eastern coast areas have a positive impact on the consumer satisfaction and loyalty[16]. Based on the results of these prior studies, it is determined that the experiential marketing of Judo gyms will have a significant effect on the consumer satisfaction, thus establishing the following hypothesis in this study.

Hypothesis 1. Experiential marketing of Judo gyms will have a significant effect on the consumer satisfaction.

### **1.2.2. Relationship between experiential marketing and exercise participation**

Most consumers pursue not only the functions and benefits of a product/service, but also things that more than what it symbolizes. Therefore, potential consumers prefer experience activities in purchasing products or services that let them temporarily experience to see if it meets their expectations[17].

A study on experience, emotion, and satisfaction at theme parks where experience

is the product that experiential marketing can affect potential consumers' emotion and ultimately their satisfaction, which can lead to maintaining a lasting relationship[7]. A research on the effect of outdoor experiential marketing on brands and purchase intention done also say that experiential marketing has a positive impact on purchase intention[18]. Based on the results of these preceding studies, the following hypothesis is established.

Hypothesis 2. Experiential marketing of Judo gyms will have a significant effect on exercise participation.

### **1.2.3. Relationship between experiential satisfaction and exercise participation**

Experiential satisfaction in sports activities can be attributed to the level of satisfaction according to the standards the person expects and can be assessed psychologically[19].

In a preceding study, it is reported that experiential satisfaction of scuba divers has a significant impact on the intention to re-participate[20], and also emphasizes the need to attract new participants by providing programs for beginners, saying that the satisfaction of paragliders has a positive effect on re-participation[21]. And a study reports that the satisfaction level of middle school students can have a positive effect on promoting their self-esteem and sociality[22]. Based on these findings, the following hypothesis is established.

Hypothesis 3. Experiential satisfaction will have a significant effect on exercise participation.

### **1.2.4. Verification of the mediation effect in the relationship between experiential marketing and exercise participation**

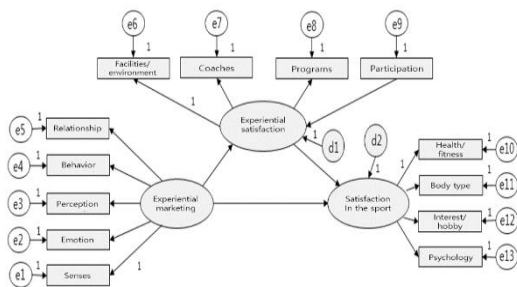
Experience is a kind of exploration before purchase by potential consumers, and it is the role of the provider to lead the participants to the final stage that is purchase[23]. This will require detailed efforts by the pro-

vider, the gym owner, to produce the results of the experiential marketing. For this reason, it is necessary to verify the relationship between experiential marketing and exercise participation.

A study on golf-related experiential marketing, satisfaction, and willingness to revisit that satisfaction through experience could be a powerful factor to continue to encourage revisit[24], and Hahn Ye-ji also says that carrying out comprehensive marketing activities including experiential marketing is effective, exemplifying that the experience factors of sports brand stores have a significant impact on satisfaction and purchase intention, even encouraging impulsive buying[25]. Therefore, based on the preceding studies, the following hypothesis is established.

Hypothesis 4. Experiential satisfaction in the relationship between experiential marketing and exercise participation will serve as a mediating factor.

Figure 1. Research model.



## 2. Research Method

### 2.1. Research subject

The study sets up a population of trainees in Judo gyms. For the research, a survey was conducted using a purposeful random sampling on the group selected from Judo gyms located in Seoul and Gyeonggi Province from February to March 2019. The research team and survey assistants visited the selected Judo gyms, sought understanding from the operator and coaches, explained the purpose of the study, encouraged the

trainees to complete the questionnaires, and retrieved them. A total of 270 copies were distributed, and a total of 248 (91.9%) were used for the analysis of this study, except for 22 questionnaires with batch or missing responses via a coding process. The demographic characteristics of the study subjects are shown in <Table 1>.

Table 1. The demographic characteristics of the study subjects.

Description		Number	Percentage(%)
Gender	Male	162	65.3
	Female	86	34.7
Age	10's	48	19.4
	20's	72	29.0
	30's	81	32.7
	40's or older	47	18.9
Occupation	Manager	21	8.5
	Self-employed	32	12.9
	Employee	76	30.6
	Student	91	36.7
	Other	28	11.3
Duration of training	>1 year	27	10.9
	1 - 3 years	148	59.7
	3 years or longer	73	29.4
	Total	248	100

### 2.2. Survey tool

For the purpose of this study, the questionnaires on demographic characteristics of the study participants, experiential marketing of Judo gyms, experiential satisfaction and exercise participation were organized based on relevant prior research, and the content feasibility was verified by one professor and two Ph.D. professional in sports management. Questionnaires consist of seven levels of Likert scale, from "very much not so(1 point)" to "very much so(7

points), and the details of the survey tool are as follows.

### **2.2.1. Experiential marketing**

The sub-factors of experiential marketing in this study consisted of five factors, including sense, emotion, perception, behavior, and relationship, following the most relevant preceding studies. Questionnaires related to experiential marketing consisted of a total of 21 questions based on the questions used in the research by literature review[26][4][27].

### **2.2.2. Experiential satisfaction**

Based on the questions used in the research by preceding study[28][29][30], the questions related to experiential satisfaction were modified and supplemented to suit the purpose of this study and consisted of 39 questions for four sub-factors to facilities/environment, coaches, programs and participation.

### **2.2.3. Exercise participation**

Based on the questions used by preceding research[31][32], the questions related to participating in sports were modified and supplemented to suit the purpose of this study and consisted of 14 questions for four sub-factories: health and physical strength, body type, fun and hobbies, and psychology.

## **2.3. Verification of validity and reliability of survey tools**

In order to verify the validity of the survey tools used in this study, the survey tools were verified by calculating the conceptual confidence values with Cronbach's  $\alpha$  to verify the exploratory and confirmed factors, concentrated feasibility, discriminating difference and reliability.

### **2.3.1. Verification of cronbach's $\alpha$ and exploratory factor analysis**

The exploratory factor analysis conducted in this study was established with an eigenvalue of 1 or higher and a factorial value of 0.5 or higher and verified using the principal component analysis and varimax

method[33]. The reliability was also validated against 0.5 or higher by calculating the Cronbach's  $\alpha$  value.

The exploratory factor analysis of experiential marketing factors for Judo gyms results in 5 sub-factors. The factorial values are shown as emotional .588-.848, relationship .658-.774, perception .628-.772, behavior .826-.855, senses .766-.857, and eigenvalue from 2.401 to 4.504, accounting for 82.363% of the total factors. The Cronbach's  $\alpha$  value was also shown to be .835-.948 to meet the criteria for validity and reliability.

The results of the exploratory factor analysis on the experiential satisfaction factors are total of 4 factors being derived. The factorial values are shown as participation .649-.825, coaches .834-.854 ,programs .679-.838 and facilities/environment. 669-.789 and eigenvalue from 5.714 to 10.700, accounting for 78.796% of the total factors. The Cronbach's  $\alpha$  value are also shown as .928-.976, indicating that all criteria were met.

Finally, the results of the exploratory factor analysis of exercise participation factors are derived. The factorial values are found to be psychology .705-.801, health and physical strength .617-.810, body type .726-.775, fun and hobbies .845-.851, and eigenvalue from 1.956 to 3.488 to account for 72.514% of the factors for exercise participation. The Cronbach's  $\alpha$  value is also shown to be .826-.88 to meet the criteria. Here, there are some opinions that fun and hobby sub-category may pose problems with the validity of the scale in question, but some counter-argue that even small questions can have sufficient predictability if the links are correctly established[34][35].

### **2.3.2. Verification of concentration and discriminant validity and confirmatory factor analysis**

The results of a confirmatory factor analysis of the survey tool with proven composition feasibility through exploratory factor analysis are shown in <Table 5>. Since the  $X^2$  index is sensitive to sample size, the GFI,

**Table 2.** Results of confirmatory factor analysis.

Potential factors	Path	Measurement factors	Standard values	Standard error	C.R	AVE	Conceptual reliability
Experiential marketing	→	Senses	.710	-	-	.709	.923
		Emotion	.876	.333	6.580***		
		Perception	.910	.362	6.633***		
		Behavior	.724	.324	5.915***		
		Relationships	.871	.373	6.572***		
Experiential satisfaction	→	Facilities/ environment	.734	-	-	.897	.972
		Coaches	.668	.084	9.727***		
		Programs	.833	.098	11.771***		
		Participation	.799	.085	11.472***		
Exercise participation	→	Health and physical strength	.811	-	-	.907	.975
		Body type	.780	.084	12.219***		
		Fun/hobbies	.776	.099	8.805***		
		Psychology	.774	.071	12.130***		

$\chi^2=130.097(df=62, p<.001)$ ,  $Q=2.098$ ,  $GFI=.927$ ,  $RMR=.047$ ,  $TLI=.945$ ,  $IFI=.957$ ,  $CFI=.956$ ,  $RMSEA=.067$

Note: \*\*\* $p<.001$ .

RMR, TLI, IFI, CFI, and RMSEA suitability indexes were comprehensively analyzed. This confirmatory factor analysis shows that the  $\chi^2$  value is 130.097 ( $p<.001$ ) and does not meet the criteria, but with  $GFI=.927$ ,  $RMR=.047$ ,  $TLI=.945$ ,  $IFI=.957$ ,  $CFI=.956$ , and  $RMSEA=.067$ , it is shown to meet the overall suitability criteria.

In addition, the concentration was verified using average variance extraction (AVE) and conceptual reliability values, and the average variance extraction value is shown from .709 to .907, which is above the usual threshold of .5, and the conceptual reliability value is shown from .923 to .975, which is also above the usual standard of .7, indicating that the concentration criterion is met [36][37].

Validation of the discriminant validity shows that the mean variance extraction value of all factors is higher than the determinant ( $r^2$ ) value between the potential factors, which also meets the criteria [37].

### 2.3.3. Correlation analysis

Correlation analysis has been conducted to analyze the associations of the factors established in this study, and it has been

found that each of the factors shows a significant correlation. The results of the correlation analysis are shown in <Table 3>.

**Table 3.** Results of correlation analysis.

	1	2	3
Experiential marketing	1		
Experiential satisfaction	.210**	1	
Exercise participation	.438**	.243**	1
M	5.298	5.947	5.162
SD	.733	.837	.765
n	248	248	248

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

## 2.4. Data processing method

**Table 4.** Hypothesis verification results.

Hypothesis	Path		Standardization factor	Standard error	t-value	Results
Hypothesis 1	Experiential marketing	→ Experiential satisfaction	.543	.224	5.210***	adopted
Hypothesis 2	Experiential marketing	→ Exercise participation	.624	.324	5.915***	adopted
Hypothesis 3	Experiential satisfaction	→ Exercise participation	.780	.084	12.219***	adopted

$$\chi^2=130.097(df=62, p<.001), Q=2.098, GFI=.927, RMR=.047, TLI=.945, IFI=.957, CFI=.956, RMSEA=.067$$

Note: \*\*\* $p<.001$ .

**Table 5.** Model suitability comparison.

Suitability	$\chi^2$	GFI	RMR	TLI	IFI	CFI	RMSEA
Partial mediation model	130.097( $df=62$ )	.927	.047	.945	.957	.956	.067
Full mediation model	192.235( $df=63$ )	.904	.063	.897	.918	.917	.071

To analyze the relationship between experiential marketing and experiential satisfaction and exercise participation, frequency analysis, exploratory factor analysis, confirmatory factor analysis, convergent validity, discriminant validity, reliability analysis, and structural equation modeling (SEM) are conducted using IBM SPSS Statistics 21 and IBM AMOS 21 programs, and to verify the mediation effect of experiential satisfaction, Sobel test is conducted.

### 3. Results

#### 3.1. Verification of the suitability of the research model

The analysis of the suitability of the research model established in this study shows the same number as the suitability index of the confirmatory factor analysis. The model in this case is referred to as equivalent models, which are not statistically distinguishable, but are only theoretically separable [38]. Therefore, it has been shown that the suitability index of the research model meets the criteria. The results of the suitability is shown in <Table 4>.

#### 3.2. Hypothesis verification results

The results of the verification using the structural equation model analysis for the hypotheses established in this study are shown in <Table 4>.

First, the results of the verification of hypothesis 1 that experiential marketing will have a significant effect on experiential satisfaction shows the standardization factor of .543 ( $t=5.210, p<.001$ ), indicating that experiential marketing of Judo gyms has a significant positive effect on experiential satisfaction. Second, the results of the verification of hypothesis 2 that experiential marketing will have a significant effect on exercise participation shows the standardization factor of .624 ( $t=5.915, p<.001$ ), indicating that experiential marketing of Judo gyms has a significant positive effect on exercise participation. Third, the results of the verification of hypothesis 3 that experiential satisfaction will have a significant effect on exercise participation shows the standardization factor of .780 ( $t=12.219, p<.001$ ), indicating that experiential satisfaction has a significant positive effect on exercise participation. Finally, in order to verify the hypothesis 4 that experiential sat-



isfaction will play a mediation role in the relationship between experiential marketing and exercise participation in Judo gyms, full mediation model and the suitability are compared and analyzed, Sobel test, a analysis method for the mediation effect presented by[39], is conducted. As shown in <Table 5> the suitability indexes of full mediation model are shown as  $\chi^2=192.235(p<.001)$ , GFI=.904, RMR=.063, TLI=.897, IFI=.918, CFI=.917, RMSEA=.071 to meet the overall suitability criteria. However, it shows the difference of  $\Delta\chi^2=62.138$ ,  $\Delta df=1$ , and the suitability indexes of the partial mediation model are relatively stable. It shows that experiential marketing of Judo gyms has a significant effect on experiential satisfaction and that experiential satisfaction has a significant effect on exercise participation, indicating experiential satisfaction plays a mediation role. The value of the Sobel test, which is a medium effect verification method, is  $2.346(p<.01)$ , which can be said to be a mediation factor and the Sobel test is also significant. And the path coefficient of the partial mediation model in relation to the experiential marketing and exercise participation is  $.624(t=5.915, p<.001)$ , and the standardization factor in the direct factor relationship is  $.642(t=6.208, p<.001)$ , which shows that experiential satisfaction factors play the partial mediation role in the relation of experiential marketing and exercise participation.

#### 4. Discussion

The purpose of this study is to identify the effect of experiential marketing of Judo gyms on experiential satisfaction and exercise participation and the mediation effect of experiential satisfaction. Judo has produced many sports stars and plays a great role in promoting the national prestige of Korea at the Olympics and international competitions. However, it has not received much public attention compared to other sports due to the mistaken perception that it is a difficult and hard exercise to be a sport for all and that it can negatively affect

children's growth. Once the number of Judo gyms and trainees increased greatly due to increased interest from the media exposure of Olympic medalists, but due to lack of promotional activities and poor operation of the gyms, the operating environment of Judo gyms have come to a standstill. Therefore, if experiential marketing activities for potential consumers who are interested in Judo are carried out continuously, they would feel the benefits of Judo, and the number of Judo trainee will increase. Based on the results of this study, the following discussion is made.

First, it has been shown that the experiential marketing of Judo gyms has a significant effect on experiential satisfaction. In a study on the relationship between experiential marketing, satisfaction, loyalty, and purchase intention. The preceding study[14] reports that experiential marketing in the marine leisure industry has a positive effect on purchase intention through satisfaction and loyalty. Literature[40] has also found that participation in a festival experience program has an impact on the satisfaction level and intention to revisit the festival in his study on the relationship among motivation, immersion, satisfaction, and intention to revisit festivals. In a study on the impact of ocean leisure sports experience on satisfaction and loyalty with tourist sites by study[16], satisfaction with marine sports experience activities at tourist sites has increased tourists' satisfaction and loyalty and has a positive effect on continuous visits to the sites. Preceding paper[13] said in a study on the relationship between the experience elements of experiential marketing, satisfaction, brand attitude, and intention to revisit that the well-organized experience factors of experiential marketing lead to the satisfaction of visitors and encourage them to revisit.

Marketing activities that provide opportunities for potential consumers to experience the product/service are the surest way to let them feel and evaluate the product/service. Therefore, if various programs are prepared and provided for potential

consumers to experience and feel the interest, it could be an effective way to increase the Judo population.

Second, it has been shown that experiential marketing of Judo gyms has a significant effect on exercise participation. Literature[3] reports in a study on the impact of experiential marketing on the intention to repurchase and recommend to others that having a positive awareness while experiencing Judo brings about a promotional effect in that existing trainees attract those around them considering the characteristic of Judo in that trainees exercise in pairs. Paper[41] also report in their study that experiential elements of sports brand stores have a positive effect on consumers' purchase intention. In addition, preceding study[42] posit that experiential marketing of sports brand stores has a significant effect on consumers' attitude and intention to purchase, claiming that good experience through experiential marketing leads quick decisions on purchasing behavior. Literature[43] claim that direct experience has a significant impact on behavior intention based on their study on the effect of experience in marine leisure sports on the behavior intention.

A Judo gym is not a tangible product, but an intangible service that provides a place and guidance through which consumers can exercise systematically. Therefore, the perceptions felt by participants in the hands-on activities can all be relative. Accordingly, the operator of the gym should maintain the best physical condition of the gym at all times and develop a variety of hands-on programs to help potential consumers decide on participation through short-term experience.

Third, it has been shown that experiential satisfaction has a significant effect on exercise participation. Preceding study[44] reports that if experience can elicit satisfaction, it is highly likely to affect subsequent purchase behavior, saying satisfaction in marine leisure sports has a significant impact on consumer loyalty. Preceding paper[17] also states that experiential market

factors positively affect consumers' satisfaction, brand attitude, and intention to repurchase and emphasizes the importance of generating satisfaction through experiential marketing because it can have a strong impact on potential consumers' purchasing behavior as the first activity that generates consumers' interest. In addition, literature[45] also supports the results of this research as it says that experience tourism has a significant influence on emotional response and experiential satisfaction and the experiential satisfaction affects consumers' behavior intention.

Experiential marketing is a marketing activity that provides potential consumers with opportunities to directly, not indirectly, experience the product/service before deciding on their consumption behavior. Therefore, it is necessary to prepare quality programs to help consumers participate in experience programs and prepare them to achieve consumers' satisfaction, which may lead to consumption behavior.

Finally, it is found that experiential satisfaction plays a mediation role in the relationship between experiential marketing of Judo gyms and exercise participation. In a study on the impact of traditional marketing and experiential marketing on brand loyalty, preceding study[46] reports that experiential marketing can bring a stronger impression and purchase effect to consumers than traditional marketing. A study[47] on experiential marketing of sports brands and consumers' purchase intention also says that the experiential marketing can serve as a bridge that leads to purchasing behavior as soon as it induces consumer satisfaction. Meanwhile, study[48] says that experiential marketing can be a strong marketing tool when well-executed, but thorough preparation is needed because failure to induce consumer satisfaction due to insufficient preparation can hinder consumer behavior.

The emotion that consumers have about experiential marketing are individual and will all be relative. In particular, this relativity can be seen as greater for intangible products than for tangible products. In the

case of experiential marketing of Judo gyms, there is a tangible element that is the physical environment of the gym, but the difference among these is not so great and what actually matters is the training programs, so the operator and coaches of the gym should develop and prepare various programs for trainees to actively participate in Judo so that they feel satisfied.

## 5. Conclusion & Suggestions

This research is aimed at identifying the relationship between experiential marketing of Judo gyms and experiential satisfaction and exercise participation. From this, it has been found that experiential marketing of Judo gyms has a significant impact on experiential satisfaction and exercise participation and that experiential satisfaction has a significant impact on exercise participation. In addition, experiential satisfaction plays a partial mediation role in the relationship between experiential marketing and exercise participation. The results are described as follows.

First, it has been found that experiential marketing of Judo gyms has a significant impact on experiential satisfaction. Second, it has been found that experiential marketing of Judo gyms has a significant impact on exercise participation. Third, it has been found that experiential satisfaction has a significant impact on exercise participation. Fourth, it has been found that experiential satisfaction plays a partial mediation role in the relationship between experiential marketing and exercise participation. In today's highly competitive society, experiential marketing is not just a promotional activity, but an effective marketing approach that provides hands-on experience opportunities and induces consumption activities of potential consumers.

Here are a few suggestions based on this research for more competent future research, First, it was not possible to take into account the characteristics of the other areas as the spatial extent was limited to Seoul and Gyeonggi Province, so attention

should be paid to generalization. In the future, it would be more relevant if other areas are also included. Second, other factors besides experiential satisfaction may play a role in the relationship between experiential marketing and exercise participation. It would be more reasonable to conduct research on a variety of factors that have been proven in the preceding study.

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## Effects of High Intensity YONGMU DO Training on Maximum Muscle Strength and Yongmudo Performance in the Adult Males

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### Abstract

*Purpose; This study was to investigate the effects of high intensity yong mu do training on maximum muscle strength and yong mu do performance in the adult males. The participants were divided into two groups: Exercise group(n=15) and Control group(n=15). The high intensity yong mu do training program for 12 weeks. The results of this study were as follows: First, there were significantly increased in harvard step, burpee test, push-up, sit-up rate. Second, there were significantly increased in kick performance, throwing techniques, self-defense. As conclusions, this study confirmed that the high intensity yong mu do training could improve the maximum muscle strength and yong mu do performance of adult males.*

**[Keywords]** *Yong Mu Do, High Intensity Yong Mu Do Training, Maximum Muscle Strength, Yong Mu Do Performance, Adult Males*

## 1. Introduction

Yongmudo was developed by Yong In University during the early 2000s to restructure Korean martial arts, and is a type of martial arts increasing in popularity with training from 36 countries worldwide. It is comprehensive martial arts that restructures the advantages of the existing martial arts techniques that rely on unified simple techniques, and applies efficient attacking techniques such as kicking, snapping, throwing and choking effectively to the physical movement[1]. Physical strength is critical for the effective performance of yongmudo. It is necessary to use the maximum level of muscular strength during each movement, and it is critical to have sustainable exercise performance with endurance, and agility and flexibility to smoothly connect each technique[2]. In addition, yongmudo technique training stresses

the importance of professional strength, and the high intensity yongmudo training is reported to show high exercise consumption and physical energy consumption[3].

High intensity yongmudo training is consisted of exercises with repeated weights, and has been receiving attention from athletes of the Chungju World Martial Arts Mastership Event and the International Yongmudo Championship as it is time-efficient and can obtain realistic exercise effects. The coordination of the physical strength factors and neurological strength factors is extremely important in the techniques of throwing and kicking that appears commonly from yongmudo due to the game regulations[3][4]. In particular, balance and weight shift which are major factors of body coordination are considered extremely important to enhance performances, and high intensity

yongmoodo training has been reported to be efficient to improve these factors[5]. High intensity yongmoodo training is a training method that is effectively used to apply the maximum muscular strength appropriate to each factor and time period and divide the physical functions effectively. It applies the advantages of various martial arts and has the format of WOD(workout of the day) where the participants are required to complete as fast as possible and as much as possible the daily exercise tasks with various exercises, and is consisted of repeating various exercise movements[4]. The high intensity yongmoodo exercise is efficient as it takes up less time than general weight training, and can modify the level of intensity to match the individual levels so that anyone regardless of exercise experiences can participate. In particular, it shifts from the existing concept of the effects of aerobic exercises to train the cardiovascular strength to have similar effects with high intensity interval training and circuit training[6][7]. In addition, the high intensity yongmoodo exercise includes repetition of movements in everyday lives such as sitting down, reaching out, pulling, lifting and running without intermittent breaks, and is reported to have similar effects with Crossfit as it includes competition during exercise to provide motivation and interest towards the participants[3][8]. A such, high intensity yongmoodo exercise is different from the traditional exercise methods that divide the types of exercise by functions into aerobic exercises, anaerobic exercises and resistance exercises to develop strength at a certain part of the body, and is consisted of exercise

programs to stimulate the muscles of the entire body without breaks to effectively improve the glucose metabolism, fat-burning and oxidative enzyme activation to enhance the body strength[6][9]. In addition, high intensity yongmoodo exercise is not limited on the muscular functions of the physical strength, but is also effective on flexibility and body coordination[3].

Therefore, this study aims to identify the effects of high intensity yongmoodo exercise programs, develop new scales to assess the strength, improvement of the variables and the techniques to develop a more efficient and effective exercise program, as well as to provide basic data on human physiology on the exercise effects of yongmoodo. In addition, as the high intensity yongmoodo exercise program will improve the health-related strength and the functional exercise performance abilities, it will be used as basic data for a new type of exercise for prevention and treatment of injuries within the sports environment.

## 2. Methods

### 2.1. Research subject

The participants of this study were male adults residing in Y district of D who have good health. The participants were given explanations on the exercises and the method, and they all submitted a statement of agreement to show that they are participating in the exercise program willingly.

**Table 1.** Physical characteristics of subjects.

*Mean ±SD*

Group	Age (yrs)	Height (cm)	Weight (kg)	BMI (kg/m <sup>2</sup> )	Muscle mass (kg)	Body FAT (%)	Basal metabolic rate(kcal)
EG (n=15)	26.42 ±3.38	174.68 ±4.72	77.54 ±6.52	26.72 ±2.22	30.64 ±4.69	20.68 ±5.04	1722.32±119.26
NEG (n=15)	27.26 ±2.84	175.36 ±5.82	76.68 ±6.84	27.02 ±2.86	31.02 ±3.99	20.92 ±4.64	1719.96±124.38



<i>P</i>	.506	.478	.384	.588	.443	.280	.225
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Note: EG: Exercise Group, NEG: Non Exercise Group.

## 2.2. Yongmoodo exercise

The 12-week high intensity yongmoodo program is shown on Table 2 and 3. The high intensity yongmoodo exercise is shown as WOD, and are divided into AMRAP(As Many Reps as Possible) where the participants are required to make as many repeated actions as possible within a certain amount of time, and time attacks where they are required to finish a certain amount of exercise as fast as possible[5][8]. The high intensity yongmoodo program of this study was on a time attack, and the exercise program was based on the Crossfit training guide by Glassman(2012) to modify it to yongmoodo[5]. The participants exercised for three times a week, and one round of exercise per day included 10 minutes of warmup exercises, one round of actual exercise, and 10 minutes of cooldown exercises.

The one round of the actual exercise did not have any time limits, and was completed when the participants finished all given exercises of all exercise types. The individual times of completion of the actual exercises were recorded daily, and when the participants finished all exercises within four minutes, the number of repetition of each exercise was increased by 10%(Glassman, 2003). The intensity of the exercise was focused on the six major joints and gradually increased the exercise intensity with RPE (Rating of Perceived Exertion) to set the intensity level at 11-12(light) from weeks 1 to 4, 13-14(quite difficult) from weeks 4 to 8 and 15-16(difficult) from weeks 9-12[22].

**Table 2.** High intensity yongmudo training.

Exercise kinds	Exercise program	Motion frequency
Kick performance	Ap-chagi, Yeop-chagi, Die-chagi, Dollyo-chagi, Stepchagi, Height-chagi	11-16RPE

Throwing techniques	Tai-otoshi, Seoi-nage, Kada-kuruma, O-uchi-gari, O-soto-gari, Uchi-mats, Harai-goshi, Uki-goshi
Self-defense	Wrist, Elbow, Shoulder, knee, Ankle

## 2.3. Assessment methods and tools

### 2.3.1. Maximum muscular strength assessment

The maximum muscular strength assessment measured the health-related strength factors such as cardiovascular endurance, muscular strength and muscular endurance. The measured variables were modified to include the concept of high intensity training to the yongmoodo exercise program to measure the variables for one minute using the AMRAP (As Many Reps As Possible) methods. The detailed contents and the measurements are shown below.

#### 2.3.1.1. Cardiovascular endurance(Harvard step test, Burpee test)

The cardiovascular endurance was assessed with the Harvard step test and the Burpee test. The participants were instructed to come up to a step box with a height of 20 inches(50.8cm) by either jumping on one foot or both feet and stand up straight. The number of the repeated action was recorded for one minute and for five minutes. For the Burpee test, the participants were instructed to stand up straight, and when instructed to start, they placed both hands on the ground, push out both feet to the back to lie downwards with the hands placed on the ground, pull back the two feet while lying face down to go back to the position before, then stand back up right away by pushing away the hands. The number of repeated actions was recorded during one minute AMRAP each.

### 2.3.1.2. Muscular endurance(Pushup, Sit-up)

The muscular endurance was assessed using pushups and sit-ups. The participants were instructed to place both hands on the ground at elbow's width with fingers pointing forward, place both feet together, make the arms have a right angle to the ground while placing the head, shoulders, waist, hips and legs on a straight line. They were instructed

During sit-ups, the participants were instructed to lie down, draw up the knees and lock the fingers together behind their heads. They were instructed to raise the upper body while lying down to touch both knees with both elbows, and then lie back down. Both shoulders had to touch the ground when lying back down. They were told not to have rebounds while coming back up. The number of each sit-up was recorded within one minute.

**Table 3.** High intensity yongmudo exercise program.

Stage	Exercise program	Rest			Motion frequency
		1~4 Week (reps/set)	5~8 Week (reps/set)	9~12 Week (reps/set)	
Warm-up (10min)	Stretching	10/3			RPE 8~10
Work-out (40min)	Kick performance	100/5			RPE 11~16
	Throwing techniques				
	Self-defense				
Cool-down (10min)	Stretching	10/3			RPE 8~10

### 2.3.2. Assessment of yongmoodo exercise performance abilities

The assessment of yongmoodo exercise performance abilities used the basic standards of the Korean Yongmoodo Federation(2013) that states the 15 basic techniques, with a frequency analysis using the five-point Likert scale. The assessment was analyzed by tallying the scores among expert evaluators including three experts with level five and above in yongmoodo, two professors of physical exercises and two experts on physical exercises. The lowest and the highest scores from the individual experts were eliminated when calculating the means.

The yongmoodo exercise performance abilities assessment used in this study showed high reliability levels from a total of eight preliminary assessment method evaluations by quarters of the year since 2014 when

the yongmoodo program was re-established; the reliability levels from a total of the expert evaluators were 76.3% from round 1, 84.2% from round 2, 88.6% from round 3, 84.2% from round 4, 89.6% from round 5, 92.4% from round 6, 91.6% from round 7 and 94.2% from round 8. The detailed methods on the assessment of taekwondo performance abilities are shown on Table 4.

### 2.4. Data process methods

This study used SPSS 20.0(window statistical package) to process the data with calculating the mean and standard deviation of all collected data, used paired t-tests to verify the significance before and after the experiment among the groups, and used the independent sample t-test to verify the homogeneity among the groups during the pretest and before and after the experiment. The significance level was set at  $p < .05$ .

**Table 4.** Yongmoodo performance abilities.

Stage		1Point (very bad)	2Point (bad)	3Point (normal)	4Point (good)	5Point (very good)
Kick performance	Ap- chagi					
	Yeop- chagi					
	Die- chagi					
	Dollyo- chagi					
	Die-Dollyo- chagi					
Throwing techniques	Tai-otoshi,					
	Seoi-nage,					
	Kada-kuruma,					
	O-uchi-gari					
	O-soto-gari,					
	Uchi-mats,					
Self- defense	Harai-goshi					
	Wrist					
	Elbow					
	Shoulder					

### 3. Results

#### 3.1. Changes of the maximum muscle strength abilities

The changes of the maximum muscular power from the high intensity yongmoodo exercise program are shown on Table 5. The EG group showed statistically significant increases on the number of Burpee tests ( $p < 0.002$ ), Harvard step tests ( $p < .001$ ), sit-ups ( $p < .000$ ) and pushups ( $p < .000$ ) from the maximum muscular power before and after the high intensity yongmoodo exercise programs, while the NEG group did not show any statistically significant difference from all variables of maximum muscular strength. Although the results of the pretest before the high intensity exercise program did not have any statistically significant differences from the variables of maximum muscular power between the two groups, the results of the posttest showed statistically significant difference between the two groups from Burpee tests ( $p < 0.000$ ), Harvard step tests ( $p < .000$ ), sit-ups ( $p < .000$ ), and pushups ( $p < .000$ ).

#### 3.2. Changes of the yongmoodo performance abilities

The changes of yongmoodo performance abilities from the high intensity yongmoodo exercise program are shown on Table 6. The EG group showed statistically significant differences of Ap- chagi ( $p < .000$ ), Yeop- chagi ( $p < .000$ ), Die- chagi ( $p < .000$ ), Dollyo- chagi ( $p < .000$ ), Die-Dollyo- chagi ( $p < .000$ ), Tai-otoshi ( $p < .000$ ), Seoi-nage ( $p < .000$ ), Kada-kuruma ( $p < .000$ ), O-uchi-gari ( $p < .000$ ), O-soto-gari ( $p < .000$ ), Uchi-mats ( $p < .000$ ), Wrist ( $p < .000$ ), Elbow ( $p < .000$ ) and Shoulder ( $p < .000$ ) from the study on the yongmoodo performance abilities by group before and after the exercise program. In addition, although the EG group showed statistically significant changes of Ap- chagi ( $p < .000$ ), Yeop- chagi ( $p < .000$ ), Die- chagi ( $p < .000$ ), Dollyo- chagi ( $p < .000$ ), Die-Dollyo- chagi ( $p < .000$ ), Tai-otoshi ( $p < .000$ ), Seoi-nage ( $p < .000$ ), Kada-kuruma ( $p < .000$ ), O-uchi-gari ( $p < .000$ ), O-soto-gari ( $p < .000$ ), Uchi-mats ( $p < .000$ ), Wrist ( $p < .000$ ), Elbow ( $p < .000$ ), and Shoulder ( $p < .000$ ) within the assessment of yongmoodo performance abilities, there were no statistically significant changes from all variables of taekwondo performance abilities from the NEG group.

**Table 5.** Changes of the maximum muscle strength abilities.

Mean±SD

Items	Groups	Pre	Post	t*
Burpee test	NEG(n=15)	27.68±4.66	33.02±2.84	3.660 <sup>†††</sup> .464
	NEG(n=15) t**	28.02±4.33	27.72±4.32 3.886 <sup>†††</sup>	
Harvard step test	EG(n=15)	37.02±5.02	43.82±5.66	3.862 <sup>†††</sup> .564
	NEG(n=15) t**	36.64±5.84 .322	35.22±4.92 3.920 <sup>†††</sup>	
Sit-up	EG(n=15)	52.82±12.64	68.02±14.84	4.882 <sup>†††</sup> .486
	NEG(n=15) t**	51.07±10.23 .269	50.92±11.06 4.482 <sup>†††</sup>	
Push-up	EG(n=15)	33.82±10.27	52.64±12.84	5.102 <sup>†††</sup> .386
	NEG(n=15) t**	32.82±10.64 .326	33.02±10.23 5.228 <sup>†††</sup>	

Note: \*: Paired t-test between pre- and post-values in a group.

\*\*: Independent sample t-test between EG and NEG in pre-test and post-test.

††, and ††† mean,  $p < 0.01$ , and  $p < 0.001$ , respectively.

#### 4. Discussions

The purpose of this study was to identify the effects of high intensity yongmoodo training for 12 weeks on the maximum muscle strength and the yongmoodo performance abilities from male adults aged between 20 and 30. After the exercise program has been completed, there was a posttest identical to the pretest to assess the health-related strength and the functional performance and compare the results. Based on the results of the study, the discussions related to prior studies are shown as follows.

The results of this study showed that high intensity yongmoodo training for 12 weeks for male adults aged between 20 and 30 statistically significantly improved the items under the maximum muscle functions such as cardiovascular endurance, muscle strength and muscular endurance. Yongmoodo is a functional, comprehensive and integrated exercise with high intensity that shows positive short-term effects on health-related strength,

skinfold thickness and blood lipids and is an exercise with a new concept to allow people to escape from boredom[10]. Kwon and Lee[6] reported from their study on the effects of yongmoodo training on the health-related strength of obese adolescents that yongmoodo training had significant effects on the cardiovascular endurance, muscular strength and muscular endurance, which is identical to the results of this study. The experiment on the effects of the 12-week yongmoodo training program on the improvement of muscular strength of elementary schools with active growth showed that yongmoodo training positively affects the muscular strength, muscular endurance and cardiorespiratory endurance, which are identical to the results of the study by Kang et al.[11] that showed yongmoodo training is effective on improving the basic strength and the professional strength of yongmoodo athletes and the study by Kang[4] that showed the effects of yongmoodo training on the exercise functions and improvement of techniques.

**Table 6.** Changes of the yongmoodo performance abilities.

*M±SD*

Items		Groups	Pre	Post	<i>t</i> *
Kick performance	Ap-chagi	EG(n=15)	3.38±.72	3.61±.64	.902
		NEG(n=15)	3.27±.84	3.45±.42	.668
		<i>t</i> **	.352	.402	
	Yeop-chagi	EG(n=15)	2.02±1.14	3.73±.66	3.776 <sup>†††</sup>
		NEG(n=15)	1.99±1.02	2.04±1.02	.684
	<i>t</i> **	.456	3.824 <sup>†††</sup>		
Die-chagi	EG(n=15)	1.16±1.12	3.34±1.46	3.724 <sup>†††</sup>	
	NEG(n=15)	1.11±1.16	1.13±1.44	.486	
	<i>t</i> **	.292	3.900 <sup>†††</sup>		
Dollyo-chagi	EG(n=15)	1.32±1.10	3.68±1.26	4.004 <sup>†††</sup>	
	NEG(n=15)	1.22±1.32	1.16±1.02	.884	
	<i>t</i> **	.398	5.164 <sup>†††</sup>		
Die-Dollyo-chagi	EG(n=15)	1.12±1.22	3.28±1.64	3.888 <sup>†††</sup>	
	NEG(n=15)	1.13±1.12	1.16±1.21	.322	
	<i>t</i> **	-.102	3.994 <sup>†††</sup>		
Throwing techniques	Tai-otoshi	EG(n=15)	1.21±1.22	3.86±1.42	4.882 <sup>†††</sup>
		NEG(n=15)	1.19±1.24	1.17±.88	.306
		<i>t</i> **	.402	5.108 <sup>†††</sup>	
	Seoi-nage	EG(n=15)	1.13±1.09	3.08±1.02	3.301 <sup>†††</sup>
		NEG(n=15)	1.11±.09	1.16±.99	.328
		<i>t</i> **	.208	3.006 <sup>†††</sup>	
Kada-kuruma	EG(n=15)	1.12±1.02	3.39±1.01	3.422 <sup>†††</sup>	
	NEG(n=15)	1.09±.98	1.06±.88	.262	
	<i>t</i> **	.306	3.884 <sup>†††</sup>		
O-uchi-gari	EG(n=15)	1.36±.89	3.82±1.02	4.998 <sup>†††</sup>	
	NEG(n=15)	1.22±.92	1.25±1.02	.104	
	<i>t</i> **	.602	4.686 <sup>†††</sup>		
O-soto-gari	EG(n=15)	1.14±1.01	3.91±1.24	4.998 <sup>†††</sup>	
	NEG(n=15)	1.11±1.08	1.12±.84	.104	
	<i>t</i> **	.446	5.396 <sup>†††</sup>		
Uchi-mats	EG(n=15)	1.11±1.12	3.68±1.18	4.885 <sup>†††</sup>	
	NEG(n=15)	1.11±.84	1.13±.64	.4202	
	<i>t</i> **	-.068	4.986 <sup>†††</sup>		
Self-defense	Wrist	EG(n=15)	1.98±1.01	3.28±1.64	4.892 <sup>†††</sup>
		NEG(n=15)	1.72±1.72	1.66±1.86	.442
		<i>t</i> **	-.368	4.002 <sup>†††</sup>	
Elbow	EG(n=15)	1.82±1.33	3.21±1.04	4.662 <sup>†††</sup>	
	NEG(n=15)	1.71±1.01	1.63±1.01	.384	
	<i>t</i> **	-.488	4.688 <sup>†††</sup>		
Shoulder	EG(n=15)	1.52±.62	2.64±1.02	3.332 <sup>†††</sup>	
	NEG(n=15)	1.72±.54	1.81±.26	.202	
	<i>t</i> **	-.268	3.228 <sup>†††</sup>		

Note: \*: Paired *t*-test between pre- and post-values in a group.

\*\*: Independent sample *t*-test' results between pre- and post-values in both groups.

†, ††, and ††† mean *P*<0.05, *P*<0.01, and *P*<0.001, respectively.

Furthermore, many prior studies on yongmoodo reported that it is efficient in overall improvement of the physical strength as it takes up less time than the general resistance training exercises, and is effective in decreasing the body fat percentage and increasing the muscles[12][5], and these results all support the findings of this study that showed the increase of the muscles and improvement of the muscular functions. In addition, these results are also identical to the results from the study by Yoo[13] that showed yongmoodo training has a positive effect on health-related strength, which may be concluded that yongmoodo training is effective on not only improving the muscular functions but also increasing the muscles.

The yongmoodo performance abilities refer to the abilities for successful functional performance while exercising such as swift change of directions and stable landings, and the techniques to control the opponent with the maximum possible physical functions during sports games. The yongmoodo performance abilities assessment shows objective figures that can comprehensively assess the physical movements of the athlete such as muscle stimulation and joint loads[14], and is an extremely practical assessment as it has similar movement patterns to those of everyday lives or exercises[15]. Posture stability during yongmoodo is reported to greatly affect the level of the game and performance abilities, and shows greater effects on the preventions of sports injury that can occur during the yongmoodo games than any other factors[16]. The posture stability of yongmoodo is reported to improve with balance training[17][18], and recently, among the many studies on prevention and treatment of sports injuries, functional performance assessment that matches the characteristics of the sports events is commonly used for the change of body type and prevention and treatment of sports injuries[19]. Furthermore, there were studies on the yongmoodo functional performance assessment and taekwondo functional performance assessment for growing children that stressed the importance of functional performance[17][19]. This study assessed the yongmoodo performance abilities from the rule

book from the Korea Yongmoodo Federation to assess the effects of yongmoodo training on the yongmoodo performance abilities of male adults, and showed that there are statistically significant differences among the exercise groups. This is identical to the results of the studies that showed balance training for stability of posture in yongmoodo positively affected the functional performance abilities of elementary school students in yongmoodo training[20][17]. In addition, these results are similar to the results from studies on Taekwondo, which is a similar type of combat sports to yongmoodo[19][17], and the results of from the study that showed that Wushu Taolu positively influenced the exercise performance abilities of elementary school students[21]. In summary of the results of this study, high intensity yongmoodo training is expected to positively affect the improvement of yongmoodo performance and the performance abilities. Although the results of this study cannot represent all sports events, if yongmoodo training is developed to have a more systematic training method, there will be extremely positive effects on expanding the foundation of yongmoodo that is continuously developing.

## 5. Conclusion

The purpose of this study was to identify the effects of high intensity yongmoodo training for 12 weeks on the maximum muscle strength and the yongmoodo performance abilities from male adults aged between 20 and 30. The conclusions from the results of the study are as follows.

First, the change of the maximum muscle strength after high intensity yongmoodo exercise programs showed a statistically significant increase from the EG group, and did not show a statistically significant difference from the NEG group.

Second, after the high intensity yongmoodo exercise program, the results of the yongmoodo performance abilities among the factors of student health strength showed statistically significant differences from the

EG group, and did not show statistically significant differences from the NEG group.

In summary of this study, it was possible to verify that the high intensity yongmoodo training program is an effective exercise on the maximum muscle strength and yongmoodo performance abilities for male adults. However, the participants of this study cannot be defined as representing the entire group of male adults, and there still lacks sufficient evidence to declare that high intensity yongmoodo training improves the exercise performance abilities and can be used to prevent sports injury and be prescribed as treatment. Therefore, there should be studies on the change of injury rates and improvement of athletic performance before and after high intensity yongmoodo training for athletes who specialize in yongmoodo.

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## A Study on the Evaluation of TAEKWONDO Internship abroad Program

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### Abstract

*The study conducted a survey of 193 taekwondo major on their perceptions of taekwondo internship abroad and found the following results. First, among the factors of the CIPP evaluation model which evaluated the Internship abroad Program of taekwondo, priority was shown in the order of assessment of the situation, output evaluation, input evaluation, and course evaluation. Second, the priority of sub-variable by factor of CIPP evaluation model evaluating the Taekwondo internship abroad program indicated the need for assessment of the situation, survey of assessment of the situation, necessity of assessment of the situation, change in recognition of output valuation, program objectives of assessment of the situation, efficiency of output valuation, human service of input evaluation, satisfaction of output evaluation, result application of output evaluation, evaluation of course evaluation, self-assessment of course evaluation, interaction of course evaluation, program contents of input evaluation, management course of process evaluation, forming atmosphere and promotion of assessment of the situation, operational support of input evaluation, material support of input evaluation, and program application feedback of process evaluation in order. Third, The sub-variable of the assessment of the situation in the analysis results of each factor of Taekwondo internship abroad program using the CIPP evaluation model were in order of demand, recognition survey, necessity, program objectives, atmosphere formation and promotion. The sub-variable of input evaluation were in order of human support, program contents, operational support, and material support. The sub-variable of course evaluation were self-assessment, interaction, management course, evaluation, and program application feedback. The sub-variable of output evaluation were order of change in recognition, efficiency, satisfaction, and result application. The results of this study can be used as basic data for qualitative improvement and improvement of taekwondo internship abroad program, and also provide useful information for career planning and exploration process of Taekwondo majors.*

**[Keywords]** CIPP, Situation Evaluation, Output Evaluation, Input Evaluation, Course Evaluation

### 1. Introduction

Taekwondo currently has about 10 million trainees worldwide and there are 8 million black belt holders in Korea[1]. 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 Organization for Standardization. Based on Taekwondo, a world-recognized sport and traditional Korean martial art, the Korean

taekwondo department was established in 1982 with Yongin University, followed by Kyunghee University in 1983, Keimyung University in 1996 and Korean National Sport University in 1997. To date, many four-year universities and colleges in Korea emphasize the academic skills of taekwondo and provide customized training to train professional leaders[2]. Although it was expected to have a positive effect on college education, which emphasized the opening of departments and professionalism, the saturation phenomenon

of Korean Taekwondo Dojang in Relative to the Population of the school age[3] and the overabundance of Taekwondo majors resulted in an imbalance in supply and demand. Employment rate of Taekwondo Department is shown in comparison with other occupational group. According to the survey by the National Statistical Office, it was a yearly high of 7.5 percent in 2012 with a steady increase since then, reaching a record high of 9.8 percent in 2016[4]. Such a serious unemployment rate has become a social problem, not just a problem for taekwondo departments, and the problem of the curriculum is also pointed out. Son Min-kyu(2013)'s prior study reported that the limitation of professional leader training course is that the current curriculum of taekwondo departments is not connected to the actual field and a high proportion of practical skill[5]. The problem of the poor choice of career paths related to taekwondo has also emerged, with a growing number of students needing help in career decisions. To solve these problems, Kang Eun-seok(2003) reports in his precedent research that taekwondo majors need to be interested in going abroad, universities need to support Taekwondo major to have overseas experience and internship abroad more than field practice, and foster professional personnel[6]. Chungbuk Health University signed an industry-academic agreement with Taekwondo World which is located in Australia to promote overseas employment and offer 20 internships and 5 employment opportunities each year to students or graduates attending the department of taekwondo diplomacy[7]. Through the MOU with the World Taekwondo Peace Corps, Wooseok University provides students with opportunities for overseas experience and supports their skills and human resources in training and foreign dispatch[8]. The U.S. runs an internship program centered on college students, and internships are used as a major factor in connecting universities and companies. On the other hand, the problem in Korea is that there are no internship programs that can be realistically realized, and as a result, it is difficult to guarantee a successful internship. The precedent study suggests that realizable and realistic internships should be developed and given to

overcome these problems[9]. The internship program is necessary to beef up the merits of educational decision making and to make up for shortcomings to help career choices and maximize the effectiveness of the program. Currently, the agency produces foreign dispatch agents with expertise, skills and good personality, but it is difficult to provide opportunities for young leaders who cannot meet the requirements of age limits and career. Faced with this problem, taekwondo majors experience internships mostly during vacation through personal recommendation by a personal connections or an advisor, connection between an overseas and a domestic Taekwondo dojang, but internships are going on without any understanding of the program and detailed preparation[10].

Currently, Taekwondo majors prefer the United States for short-term internships or overseas employment, and a lot of leaders are produced. However, there are many cases where illegal internship programs are conducted with just tourist visas(ESTA), and these problems need to be improved[11]. Kim Joo-yeon(2007) reports that there is a lack of useful data for prospective leaders due to the uncertainty of the research and evidence for the Taekwondo majors[12]. In order to experience internships abroad a little easier, it is true that prescribed taekwondo programs abroad are needed, and various studies are needed to help majors planning internships abroad. Therefore, this study investigates the perceptions of majors about taekwondo internship abroad through systematic analysis of the component factor by context, input, process and product category using CIPP evaluation model to prioritize CIPP evaluation factors. The purpose of this study is to find the basic data about overseas employment of people who are Taekwondo major and improvement direction of Taekwondo internship abroad in the future.

## 2. Methods

### 2.1. Subject of study

This research target consisted of a students and graduates majoring in taekwondo from

four-year universities and colleges that included taekwondo departments across the country. From March to April 2019, the survey period was approximately one month, and the URL of the questionnaire using Google's questionnaire template was sent to mobile for responses using the Convenience sampling method and the selfadministration. The total number of samples from the questionnaire collected was 193 and the total number of valid samples was 170, with the exception of 23 data printed in the spreadsheet containing incorrect data and non-response. The demographic characteristics of the study are shown in <Table 1>.

**Table 1.** Demographic characteristics and internship questions.

Variable	Division	N	%
Gender	M	123	72.4
	F	47	27.6
Intern experience	Existence	96	56.5
	Non-existence	74	43.5
Term	Less than 3 months	46	47.4
	3 - less than 6 months	34	35.1
	6 - less than 1 year	13	13.4
	More than one year	4	4.1
Area	North America	67	69.8
	South America	4	4.2
	Asia	15	15.6
	Europe	3	3.1
	Other	7	7.3

Count	None	74	43.5
	1 or more times	80	47.1
	3 or more times	16	9.4
Age	20's	156	91.8
	30's	12	7.1
	40's	2	1.2
Marital status	Single	163	95.9
	Married	7	4.1
Education	High school graduation or above	9	5.3
	At college	16	9.4
	College graduate	5	2.9
	At university	91	53.5
	University graduate	39	22.9
Job	Graduate school	10	5.9
	Official	4	2.4
	Technical / office work	3	1.8
	Service / self-employment	12	7.1
	Professional	16	9.4
	Housewife	2	1.2
	Student	112	65.9
Etc.	21	12.4	

## 2.2. Research tools

The questionnaire was used to achieve the objectives of this study. And it was modified and supplemented from the survey tools used in the precedent study considering the contents of this study and characteristics of the study subjects. The questions in this study are as shown in <Table 2>.

**Table 2.** Questionnaire for taekwondo overseas internship program evaluation tool.

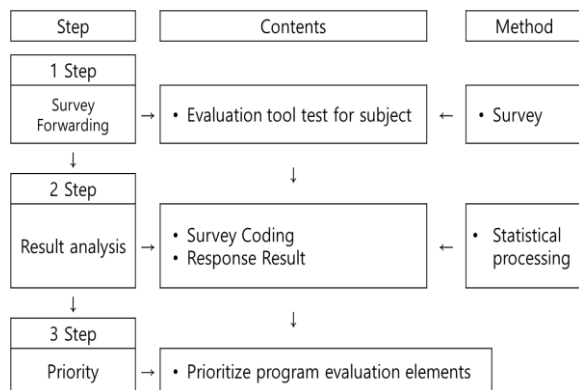
CIPP evaluation factors	Subvariables	Questionnaire
Situation evaluation	Necessity	1. Necessity of taekwondo internship abroad for capacity building
		2. Necessity of taekwondo internship abroad for employment problem solving
		3. Necessity of taekwondo internship abroad for professional leadership
	Recognition survey	4. Awareness of the contents of taekwondo internship abroad
		5. Awareness of the effect of taekwondo internship abroad 1
		6. Awareness of the effect of taekwondo internship abroad 2
	Demand	7. Whether the requirements of the operating organization are reflected
		8. Whether professional needs are reflected
		9. Whether participants' needs are reflected
	Program goal	10. Necessity of operating taekwondo overseas internship program
		11. Program goal operations
		12. Operation of specific program goals

		13. Achieve program goals achievable 1	
		14. Achieve program goals achievable 2	
	Create and promote mood	15. Atmosphere of administration of taekwondo overseas internship program 1	
		16. Atmosphere of administration of Taekwondo overseas internship program 2	
		17. Atmosphere of administration of Taekwondo overseas internship program 3	
		18. Whether to promote taekwondo internship program overseas	
input evaluation	Program content	19. Connectivity of program content and curriculum	
		20. Connectivity of program content and educational goals	
		21. Connectivity of program content and learning objectives	
			22. Program content and major's connection
	Physical support	23. A optimal budget cost	
		24. Use budget for reasonable purposes	
			25. Place of internship and facility space
	Human support	26. Professionalism of manager of taekwondo internship abroad program	
		27. Support of agency for taekwondo internship abroad program	
			28. Support of manager for taekwondo internship abroad program
Operational support	29. Promotional activities for program		
	30. The provision of continuous information related to the program		
course evaluation	Self-evaluation	31. Active participation	
		32. Internship knowledge	
	evaluation	33. Internship preparation	
		34. Responsibility	
		35. Internship operations competency	
		36. Teaching skill 1	
		37. Provide feedback	
		38. Training atmosphere	
		39. Trainee's observance of learning time	
		40. Active participation of trainees	
		41. Teaching skill 2	
Operation process	42. Operational status management		
	43. Program configuration procedure		
	44. Adequacy of operating time		
	45. Mutual respect		
	46. Interaction between the operator and the participants		
Interaction	47. Interaction between participants and trainees		
	48. Problem solving possibility		
Program application feedback	49. Willingness to participate later		
	50. Overall satisfaction		
	51. Provide feedback 2		
change of perception	52. Understand of internship content		
	53. Awareness improvement		
	54. Achievement of internship goals		
	55. Necessity		
	56. Interest in an internship program		
output valuation	efficiency	57. Acquisition of leadership	
		58. Improve your expertise	
		59. Use of internship programs	
		60. Strengthening educational capacity	
Degree of satisfaction	61. Participant's satisfaction		
	62. Manager's satisfaction		
		63. Operating satisfaction	
	Take advantage of	64. Internship utilization 1	

### 2.3. Research procedure

This research is aimed at analyzing the evaluation of taekwondo majors on the Taekwondo Internship abroad Program, supplementing the program and providing information to help the major in overseas employment. The research process for achieving this objective is shown in <Figure 1>.

**Figure 1.** Research procedure.



### 2.4. Data processing

SPSS 25.0 program was used for data analysis of this study, the statistical significance level was set to  $p < .05$ . The demographic characteristics of the study subjects conducted frequency and descriptive analysis, and the validity of the questionnaire was used in the precedent study, and the content adequacy of the questionnaire was verified later by a group of experts. Multicollinearity was verified through correlative analysis between variables, and after verifying that there are no problems with the multicollinearity, the evaluation model of the CIPP was applied and the evaluation of the majors on the Taekwondo internship abroad program was investigated using the average analysis.

## 3. Results

### 3.1. Changes in body composition before and after qigong for the elderly

The analysis result of taekwondo internship abroad program using the CIPP evaluation model is shown in <Table 3>.

**Table 3.** Analysis results of taekwondo overseas internship program evaluation factors.

CIPP evaluation factor	M	SD	Ranking
Situation evaluation	3.92	.652	1
Input evaluation	3.68	.762	3
Course evaluation	3.68	.798	3
Output evaluation	3.83	.757	2

### 3.2. Changes in physical fitness before and after qigong for the elderly

The rankings of taekwondo internship abroad programs using the CIPP evaluation model are shown in <Table 4>.

**Table 4.** Analysis of ranking of subvariables by evaluation factors of Taekwondo internship program.

CIPP evaluation factor	M	SD	Ranking
Situation evaluation (demand)	4.10	.662	1
Situation evaluation (Awareness survey)	3.98	.788	2
Situation evaluation (Necessity)	3.93	.795	3
Output evaluation (Change of perception)	3.89	.773	4
Situation evaluation (Program goal)	3.89	.760	4
Output evaluation (efficiency)	3.86	.799	5
Input evaluation (Human support)	3.80	.785	6
Output evaluation (satisfaction)	3.80	.873	6
Output evaluation (Result application)	3.79	.831	7
Course evaluation (evaluation)	3.78	.885	8
Course evaluation (Self-assessment)	3.76	.918	9
Course evaluation (Interaction)	3.75	.867	10
Input evaluation (Program content)	3.73	.797	11
Course evaluation (Operation process)	3.72	.921	12

Situation evaluation (Motivation and promotion)	3.70	.789	13
Input evaluation (Operations support)	3.64	.867	14
Input evaluation (Physical support)	3.57	.943	15
Course evaluation (Applied feedback)	3.50	1.002	16

### 3.3. Ranking of CIPP evaluation factors of taekwondo overseas internship program

The rankings of each factor using the CIPP evaluation model of the Taekwondo Information abroad Program are as follows: <Table 5>, <Table 6>, <Table 7> and <Table 8>.

**Table 5.** Analysis of factors in evaluating taekwondo overseas internship program.

Situation evaluation	M	SD	Ranking
Demand	4.10	.662	1
Awareness survey	3.98	.788	2
Necessity	3.93	.795	3
Program goal	3.89	.760	4
Motivate and promote	3.70	.789	5

**Table 6.** Analysis of factors in input evaluation of taekwondo overseas internship program.

Input evaluation	M	SD	Ranking
Human support	3.80	.785	1
Program content	3.73	.797	2
Operational Support	3.64	.867	3
Physical support	3.57	.943	4

**Table 7.** Taekwondo overseas internship program course evaluation factor analysis.

Course evaluation	M	SD	Ranking
Self-assessment	3.76	.918	1
Interaction	3.75	.797	2
Operation process	3.72	.921	3
Evaluation	3.69	.867	4
Program application feedback	3.50	1.002	5

**Table 8.** Taekwondo overseas internship program output evaluation factors analysis.

Output evaluation	M	SD	Ranking
Change of perception	3.89	.773	1
Efficiency	3.86	.799	2
Satisfaction	3.80	.873	3
Utilization of results	3.79	.831	4

## 4. Discussion

This study evaluates Taekwondo internship program using CIPP evaluation model, and this study aims to provide basic data for career planning, investigation process and program establishment for the overseas employment of taekwondo major by evaluating an essential evaluation factor of internship and finding the priority sub-variables of program through a priority analysis using the average.

### 4.1. Analysis of taekwondo overseas internship program using CIPP evaluation model

According to the evaluation result of majors in the Taekwondo Internship abroad Program using the CIPP evaluation model, situation evaluation(3.92) was the highest, followed by output valuation(3.83), input evaluation(3.68), and process evaluation(3.68).

These results indicate the importance of assessment of the situation in the first planning stage of the CIPP evaluation model. An Assessment of the situation helps to plan through the diagnosis of the surrounding environment and the perception survey of program need of target group

This study consists of sub-factors such as necessity, perception survey, demand, program goals, forming atmosphere and promotion, and it can be seen that many previous studies on the CIPP evaluation model also constitute sub-factors of assessment of the situation[13][14].

The importance of the program to improve overseas employment of Taekwondo major in Kwon Jae Hyuk 's research is also presented in previous study, and The necessity of opening and providing programs to enhance the professionalism and employment rate of Taekwondo majors through prior education supports the results of this study[11].

Taekwondo majors are aware of the goals and necessities of the Taekwondo internship abroad program and have an atmosphere to accept internships abroad. However, it can be seen that input valuation(program content, material support, human service, operational support) and process evaluation(self-assessment, assessment, process of operation, interaction, program application feedback) are relatively less ranked than assessment of situation. This is consistent with Kim Ju-yeon(2007)'s research pointed out as problems[12].

#### **4.2. Ranking of evaluation factors for taekwondo overseas internship program using CIPP evaluation model**

After analyzing the Taekwondo internship program using the CIPP evaluation model and deriving the priority by the average of the sub variables of factors, the demand for assessment of situation(4.10) was the highest. Next, the perception survey of assessment of situation(3.98), the need for assessment of situation(3.93), the change in perception of output evaluation(3.89), the program objectives of assessment of situation(3.89), the efficiency of output evaluation (3.86), the human service of input valuation(3.80), satisfaction of output evaluation(3.80), result application of output evaluation(3.79), evaluation of process evaluation(3.78), self-assessment of process evaluation(3.76), interaction of process evaluation(3.75), program content of input valuation(3.73), operational process of process evaluation(3.72), forming atmosphere and promotion of assessment of situation (3.70), operational support of input valuation (3.64), material support of input valuation (3.57), program application feedback of process evaluation(3.50). In the study of Park Young-lim(2012), taekwondo internship abroad helps student to improve the effect of

skills related to future careers such as open attitudes, communication skills, and respect for culture[10]. When analyzing the coaching efficacy of domestic and foreign internship experiences, it is reported that the coaching efficacy of the group who experienced internship abroad is higher. Therefore, Taekwondo internship abroad has a positive effect on Taekwondo majors and the necessity of internship was also verified. However, Taekwondo leadership abroad program is well reflected by the needs of participants, operating institutions and experts now, but it is considered necessary to supplement and improve the program through feedback after operation program relatively. A study by Jeong Mi-jung(2017) reports that university students feel anxious about their career and job search, have difficulty choosing their career, and this phenomenon can lead to decrease to the interest of their major[15]. Therefore, it is necessary to organize and improve taekwondo experience abroad programs that can enhance experience and satisfaction of major. In addition, Lee Min-haeng (2018)'s study on the impact of overseas experience on taekwondo value, satisfaction of the major and intention of career choice found that it is possible to form a bright future for Taekwondo and improve the range of career choices as the satisfaction of Taekwondo majors increases[16]. It means as the importance of the connectivity between curriculum and internship programs and the program should be carried out to reflect the requirements of the major.

#### **4.3. Ranking of CIPP evaluation factors of taekwondo overseas internship program**

##### **1)Situation evaluation**

Demand(4.10) was the highest priority for the assessment of the situation, followed by perception survey(3.98), necessity(3.93), program objectives(3.89), forming atmosphere and promotion(3.70). The Taekwondo Internship abroad Program reflects the current needs of participants and management agency. Participants were also aware of the contents and effects of the internship program, and the Taekwondo internship abroad



program was found to be necessary for strengthening ability, solving employment problems, and fostering professional leaders. On the other hand, specific program objectives and achievable program goals should be made. Kang Eun-seok's(2010) study found that Taekwondo majors had a high interest in overseas expansion but there were few people who prepared relatively[17]. It seems to be consistent with the results of this study that it is necessary to establish an identity and change the perception of the major of this study. Therefore, it seems necessary to create an atmosphere that leads to the promotion and participation in taekwondo internship abroad and to improve the overall program.

#### 2)Input evaluation

Human service(3.80) was the highest priority for the sub-variable of input valuation, followed by program contents(3.73), and material support(3.57). This result indicates that majors and staffs who participate in the Taekwondo Internship abroad Program have expertise and the institute provides help to participants. It also showed that taekwondo internship abroad program maintains a good connection between the contents of the program and the curriculum, educational goals and learning goals of the major. On the other hand, sub-variables that need improvement are mentioned in the problems of previous studies. Kwon Jae-hyuk(2017)'s study mentioned the importance of visa, pointing out the problems caused by tourist visa[11], and also mentioned that Kim Yong-nam(2002)'s study needed an introduction to the routes and specific circumstances related to overseas expansion[18]. Therefore, it is deemed necessary to pay attention to the management agency's promotion activities for participants, feedback of staff, budget issues, and provision of a place to perform.

#### 3)Course evaluation

Self-assessment(3.76) was the highest priority for the process evaluation, followed by interaction(3.75), operational process(3.72), evaluation(3.69), and program application feedback(3.50). These results indicate that Taekwondo majors are active in Taekwondo

internship abroad and have knowledge about internship. The interaction between the management agency and the participants and the interaction between the participants and the trainee are shown to be working well, and the organization and operation time of the program are considered appropriate. Evaluation of operational leadership and teaching skills during internships should be well done and maintained, but the application of feedback to the program should be improved and supplemented after understanding overall satisfaction with the intent to participate later. This is consistent with the results of previous studies by Kim Joo-yeon(2007), Kang Eun-seok, Kwak Jung-hyun and Lee Jae-don (2010)[12],[19].

#### 4)Output evaluation

Change in recognition(3.89) was the highest in the sub-variance priority of output evaluation, followed by efficiency(3.86), satisfaction(3.80), and result application(3.79). After finishing the Taekwondo internship, there is an improvement in understanding the contents of the internship and achieving the goal, and the recognition and necessity of the overseas employment and internship are also increased. Through internships, it can lead to the improvement of the leadership, professionalism and educational ability of the major. Based on philosophy and personality, Kwon Jae-hyuk(2017) reports that a sense of purpose and mental attitude are factor of success of overseas employment[11], and Park Young-lim(2012)'s study shows that internship experience has a positive effect on improving technical guidance and character development. However[10], if the students pay attention to the improvement of the program using the level of satisfaction and the result after the internship program, and maintain and supplement the current status, the participation of majors in the Taekwondo Internship abroad Program and the possibility of overseas employment will be increased.

## 5. Conclusion

This study aims to evaluate taekwondo internship abroad program using CIPP

evaluation model, it analyzes taekwondo major's recognition level and priority of CIPP evaluation factor, identifies improvement and security of program, and explores future taekwondo major's career plan and overseas employment to provide basic and effective data. The results of the analysis on the satisfaction and preference factors of the Taekwondo internship abroad program through this study are as follows.

Among the evaluation factors of Taekwondo internship abroad program using CIPP evaluation model, factors related to assessment of situation(necessity, perception survey, demand, program objectives, forming atmosphere and promotion) were the most important factors. On the other hand, process evaluation(changes in perception, efficiency, satisfaction, and results application) was found to be a factor that needs improvement. It is in the process of correcting and making up for the program by judging whether the program is well progressed and what is the problem when it is put into the real spot. As it is currently ranked lower among the evaluation factors, it is deemed that a preemptive improvement is needed.

Among the sub-variables of the CIPP evaluation factors, the items related to the needs of the assessment of situation were ranked highest, and it was confirmed again that acceptance of the requirements in program planning and operation should be the most fundamental. Program application feedback in the process evaluation was ranked relatively low, which is considered to be a poor complement to the overall satisfaction and willingness to participate in the program. So we would make effort to supplement these things.

Among the CIPP evaluation factors, the change in perception of assessment of situation, human service of input valuation, self-assessment of process evaluation, and evaluation of output evaluation, which are the priority of each factor, were relatively higher than other sub-variables. Although it is a factor that should be maintained continuously in internship abroad programs, the forming atmosphere and promotion of the assessment

of situation, the material support of input valuation, the program application feedback of the process evaluation, and the result application of the output evaluation are relatively low in the priority of each factor. In order to improve the satisfaction and quality of the program, it is necessary to supplement and improve the current status.

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## A Research on the INJURY by Exercise among TAEKWONDO Poomsae Athletes in Korean Universities

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### Abstract

*The present research strives to offer aid for the prevention and curing of athlete injuries by grasping the cause and cure for sports injuries of Taekwondo Poomsae (A systematic sequence of moves in Korean martial arts) athletes in Korean Universities. For this, an in-dept interview was conducted with 7 college athletes enlisted in the Korea Taekwondo Association presently in 2019, and by taking into account the opinions of research participants and through the comparing and examining of various measures from previous researches, a research result was derived.*

*Firstly, the experience of sports injury among Taekwondo Poomsae athletes in Korean universities was most common during their high school days.*

*Secondly, the technique which causes the most injury among the Poomsae in Taekwondo was found to be training in kicking, namely moves such as Yeopchagi.*

*Thirdly, in Taekwondo Poomsae, in most cases athletes were injured during the training procedure rather than during the competition.*

*Fourthly, after the injury was experienced there was no instance of psychological rehabilitation.*

*Lastly, in order to prevent damage, not only the athlete but also the instructor must cooperate, and a systematic basic health training system, a personal health maintenance system, and new psychological rehabilitation programs for those injured need to be applied.*

*The prevention of accidents can be done by the appropriate practicing of the basic moves and learning of the techniques, an adequate warm up before the competition, a systematic exercising program's planning and training, and care taken by a routine psychological counseling and efforts to avoid a slump. Also, there is the need to accumulate knowledge on the cause of wounds and its prevention, and conduct safety instruction sessions.*

**[Keywords]** Martial arts, Taekwondo, Poomsae Athlete, Sports Injury, Psychological Rehabilitation

## 1. Introduction

### 1.1. The need for research

There were first attempts to render Taekwondo Poomsae into a competition in the First Taekwondo Hanmadang Contest (1992) organized by the World Taekwondo Headquarters, and with this as the starting point a Poomsae contest was activated and Taekwondo Poomsae spread with Taekwondo training sites serving the major

participants [1]. Afterwards, with the enactment of Korea Taekwondo Association's Poomsae competition rules, the sports were actively made into a competition. Presently with the World Taekwondo Poomsae Athletic contest being conducted, and the sports being officially chosen by the Asian Game, The Summer Universiade and the World Master Game, there are also movements to make the sports a major game in a comprehensive sports competition by continent [2].

The development of Taekwondo techniques caused variations in Taekwondo moves and the complexity of technique. Poomsae requires the carrying out of each move through the control over the intensity, shouts, eye level and breathing; it also needs techniques which have a higher aesthetic level and difficulty in order to reach a level superior to that of the competitor. The Yeopchagi of authorized Poomsae which is a move in which the athlete kicks straight up and over his own height is considered the “flower of Poomsae” [3]. But competition due to the competitions resulted in a more intense technique training in order to complete moves which are more difficult to carry out, leading to the injury of athletes occurring more often[4].

Until today, researches related to Taekwondo injuries often concentrated on those who competed in one on one competitions[5], and only recently have researches been conducted on injury through movement demonstrations and the breaking apart of objects. However, there have been few researches on sports injury with Poomsae athletes as the subjects[6].

Especially, sports injuries often occurring during training or competitions affect the psychological aspects of the athlete[7], causing slumps, fatigues and stress and even leading to the athlete giving up on his career, which is why psychological damages must be managed with care[8].

In order to prevent injury, knowledge is needed on its mechanism, and the instructor and athletes will have to carefully reexamine the present state of sports injuries occurring in Taekwondo Poomsae athletes, and the necessary measures for its prevention or treatment[9].

Thus, this research aims to start a discussion on the causes and treatment of sports injuries as perceived by the Taekwondo Poomsae athletes in Korean universities, derive a plan for an improvement, and reexamine the knowledge and change of perception on sports injuries among instructors and athletes.

## 1.2. The object of the study

This research is one on the sports injury on Taekwondo Poomsae Athletes in Korean Universities, and was conducted for the research purpose of comprehending the body part which was injured, the form of injury, the time when it occurred and its cause, all due to the attributes of the Taekwondo Poomsae as a competition,, and later shed light on an effective solution.

## 2. Research Methods

### 2.1. Research participants

In order to meet the aim of the present research, the research participants were selected according to the standards conferred on and chosen by the group of professionals who were colleagues serving consultants to the research. The constituents of the group were a professional on sport injuries, two professors majoring in Taekwondo studies, and two professional Taekwondo instructors. The total of five professionals offered the following selection criteria in order to constitute the research participant. One, the athlete must be one who maintained his status and was enlisted for more than five years as a Korean Taekwondo Association athlete. Second, the athlete must be one who participated in domestic contests more than ten times. Third, the athlete must have been awarded more than once within the domestic contests. According to these criteria 7 Poomsae athletes were chosen as research participants. The general attributes of the research participants are as shown on <Table 1>.

**Table 1.** The general attributes of the research participants.

No.	Gender	Grade	Career
Participant A	Man	4	9 years
Participant B	Man	3	7 years
Participant C	Man	3	8 years

Participant D	Man	2	6 years
Participant E	Female	3	7 years
Participant F	Female	2	7 years
Participant G	Female	2	6 years

## 2.2. Research means

In the course of the research a main research means used was in-depth interview. In order for the interview to be conducted effectively, a structured question guide was used. While the in-depth interview was being done, the situation was recorded, and later the participant's answer was coded into words using a computer program and made a text file. The question guide for the interview was set after consulting the group of professionals. The basic questions for the in-depth interview is as seen on <Table 2>.

**Table 2.** Question content.

Question content
When did you first experience a sports injury? Why were you injured?
Which technique or training causes an injury most often while training for Taekwondo Poomsae?
When are you most often injured while completing a Taekwondo Poomsae?
How do you treat a sports injury?
What is a problem you faced after a sports injury?
What measures would you take to prevent sports injuries?

## 2.3. The analysis of data

The data collected through an in-depth interview with the research participants was placed under repeated inductive category analysis and the opinions of the subjects were accepted.

## 2.4. Validness and trustworthiness

The present research takes use of the critical analysis method of data divided into levels in order to secure the validness of data and

trustworthiness of research conducting. According to a procedure which examines the consistency and accuracy of the data collected in the qualitative research, the data underwent professional examination for securing its validity and level by level criticism of material. Thus, the research was based on content validity verification which examines whether the intention of the researcher, which is not objective data, was met. A content validity verification is a way in which the contents of the data derived from the research procedures are examined and considered, and the group of professionals joined for the research exchange opinions consistently and repeatedly check the appropriateness of the data.

## 3. The Cause of Sports Injury among Taekwondo Poomsae Athletes and Means of Improvement

### 3.1. The period in which injuries occur in Taekwondo Poomsae

Upon inquiring Taekwondo Poomsae athletes in Universities on the time of their injury, it was found that they suffered the most injuries during their high school days. Such a result was derived from the fact that there is a fierce competition in High school competitions, intensive training has to be done in order to apply for college, and there are many competitions to be attended.

Most research participants were found to suffer their first injuries during high school. It can be seen this is due to the fact that a scientific and systematic training program has not been offered, and that the training is done concentrating on techniques rather than basic bodily capacities, which is an inner factor of sports injuries.

### 3.2. Wound inducing techniques in Taekwondo Poomsae

The techniques which causes injuries in Taekwondo Poomsae most often were kicks such as the move of side kicking. Most research participants mentioned that they suffered the most injuries on the waist and hamstrings while kicking. Thus, the instructors

need to specifically intensify the stretching during warm ups and cool downs for exaggerated techniques such as kicking, and in particular take special measures to strengthen the stretching on muscle parts used while kicking[10].

### **3.3. The situations which cause wounds in Taekwondo Poomsae**

In Taekwondo Poomsae, the research participants mention that they are more often wounded while training rather than in a competition. According to the attributes of a Poomsae game, in order to win the athlete must minimize his error or mistakes than his opponent, and in order to carry out the move in perfection while training the athlete is wounded by overworking himself or repeatedly practicing a move in the wrong way.

### **3.4. Problems after the sports injury**

Most of the research participants appeared to have experienced a negative shift in emotions such as psychological stress, depression, and anxiety after experiencing an injury. It is easy to overlook negative ways and emotions caused by the damage. Should the psychological rehabilitation not be done in earnest, an extreme circumstance such as a serious slump or the giving up on the sport can occur. Thus, it is important to acknowledge that psychological rehabilitation is as crucial as a physical one[11].

### **3.5. Measures to prevent sports injury of Poomsae athletes**

In order to prevent sports injury, firstly there has to be an improvement on basic bodily capacity through professional training[12]. The moves in Taekwondo Poomsae need to be maintained for a certain period of time with adequate breathing and requires a momentary energy, which is why in order to prevent being wounded while executing such techniques the basic capacity of the body needs developing.

Secondly, an organized system regarding the athlete's ability needs constructing in order to prevent bodily damage. Before participating in a competition, detailed monitoring such as body examination, the enhancing of

basic body capacity, warm ups and cool downs, the putting on of protective appliances and safety checks are necessary.

Thirdly, a psychological rehabilitation program after an injury is urgently needed. Poomsae athletes experience bodily damages often during training. Their stress, depression and anxiety, negative emotions and actions should not be overlooked. Through psychological training to prepare the athletes for such circumstances, we can prevent sports damage effectively.

## **4. Conclusion and Suggestion**

The present research examined the cause of sports damage and the real-life treatment as Taekwondo Poomsae athletes in Universities and strove to find measures of improvement. The conclusions are as follows.

Firstly, the sports injury in Taekwondo Poomsae occurs most often during high school days. Secondly, the technique training which causes the most injuries in the sports was in kicking such as Yeopchagi. Thirdly, injuries during the sports more often occurred in training rather than in actual competitions. Fourth, there was no instance of psychological rehabilitation after the injury.

Lastly, in order to prevent the physical damages of Taekwondo Poomsae athletes, not only athletes but instructors need to unite. In particular, a structured training system for the basic bodily capacity, a personal body maintenance system, and a psychological rehab program in case of injuries need to be set into action. In order to prevent unfortunate accidents, basic postures need adequate practicing and the techniques need be learnt, warm ups before competitions need be conducted, the planning and training of a systematic exercise program needs executing, and care must be taken in physical counseling and prevention of a slump. In addition, knowledge must be accumulated and a safety education done on the cause and prevention of wounds.

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## Biomechanical Analysis of TAEKWONDO 'Geodeup Yeopchagi' Kick

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### Abstract

*The purpose of this study was to analyze the movements of the lower extremity joints during a taekwondo kick motion called 'Geodeup Yeopchagi', which was administered to players to improve their balance, stability, and range of motion for the prevention of injuries. The subjects of this study were eight selected skilled practitioners and eight unskilled athletes who had won the national competition from the Poomsae athletes who have been registered with the Korea Taekwondo Association for more than three years. Before entering the experiment, each subject was asked for consent and explained how to proceed with the experiment. Kinematic data were collected by four real-time infrared cameras. The hip joint, knee joint, and ankle joint angles were measured using instruments. Data processing: The statistical process of this study calculated the mean and standard deviation ( $M \pm SD$ ) using Excel 2018, and the statistical program (SPSS 22.0, SPSS Inc., Chicago, IL, USA). The Shapiro-Wilk test was conducted to verify the normality of the collected data. Independent t-test was performed to analyze the effects on the kinematic variables according to the kicks of Taekwondo Poomsae athletes and amateur. test and assay (Mann-Whitney U test) were performed and the significance level of all statistics was set to  $\alpha = .05$ . During the 'Geodeup Yeopchagi' kick motion, there were small and inconsistent effects on each joint. The results showed that the characteristics of the poomsae are to balance the feet when hitting the side kick close to 170 degrees quickly and to maintain the CoM close to the base and to support the side kick in order to contribute to the stability of the whole body. We indicated that is correct footing is an important factor in minimizing the next deduction factor. This comparative analysis of the taekwondo kicking motion is considered a very valuable study that can provide important information to the training site or school site. Further studies are needed to analyze the difference between the success and failure of the next kick, the required muscle activity, and the various and instantaneous speed of the center of gravity.*

**[Keywords]** Taekwondo, Gedeup Yeopchagi, Kick, Biomechanical Analysis, Poomsae

## 1. Introduction

Taekwondo Poomsae has been developed in various forms since the Taekwondo Hanmadang Competition in 1992. Besides the 1st World Taekwondo Poomsae Championships in 2006, the Belgrade Summer Universiade in 2009, 2013 Summer Deaflympic, 2018 Jakarta as an official event for the Asian Games, it has become one of the most recognized competitions in international

competitions. In Korea, more than 10 national-level elite competitions are recognized annually by the Korea Sports Association, and the amateur competitions show the enthusiasm of 1,000 to 3,000 participants at each event. The Taekwondo Poomsae competition is a competition in which how to express the technical factors of Poomsae by pure body ability without the aid of tools[1]. The scoring criteria for Poomsae competitions are classified by accuracy, skill, and expressiveness,

and the scores are deducted by evaluating immature behavior or mistakes based on perfect scores. In the evaluation of the kicks, when there are no special regulations, the goal of all kicking techniques is to go beyond the face[2]. Factors affecting win and lose in Poomsae competition can be divided into physical and technical factors, and physical factors include physical fitness and technical factors such as effective skill proficiency. Among the technical factors, the kick of the poomsae race is higher than a face, so it requires a lot of stamina and technical factors. In addition, it is no exaggeration to say that a single mistake not only plays a very important factor in determining the win or loss of a game, but also plays a large part in evaluating the overall content. Of these, the side kick is one of the kicks with difficulty of supporting the front leg from the front and kicking the foot to the rear leg[3]. In fact, many athletes participating in the Poomsae tournament complain a lot of difficulties in the sidekicks, and most of them are judged by the difference in skills in the sidekicks. Kang[4] said that the side kick is the most used kick in the poomsae(34 times, 79.1%). And it can cause from anterior cruciate ligament and cartilaginous plate damage due to rapid footwork and instantaneous rotation[5]. Wang[6] stated that Taekwondo Poomsae players do not hit something directly, but they receive extra points as the correct movement and kick height improve, and they are injured during training or competition due to excessive movements. Therefore, kicking is a skill with high difficulty and high risk of injury. Looking at the various previous studies related to the Taekwondo side kick, motion analysis studies on the side kick technique for improving the performance of the competition athletes and poomsae players are steadily progressing[7][8]. However, comparative studies on kinematics for skilled and unskilled athletes in relation to sidekicks used in actual poomsae competitions are insufficient. This, comparative analysis of the taekwondo kicking motion is considered a very valuable study that can provide important information to the training site or school site. Therefore, the purpose of this study is to present the basic data to improve the performance of

Taekwondo by finding the differences and commonalities after comparing and analyzing the technical performances during repeated kicking.

## 2. Research Method

### 2.1. Subjects

The subjects of this study were eight selected skilled practitioners and eight unskilled athletes who had won the national competition from the Poomsae athletes who have been registered with the Korea Taekwondo Association for more than three years. The general characteristics of the study subjects are shown <Table 1>.

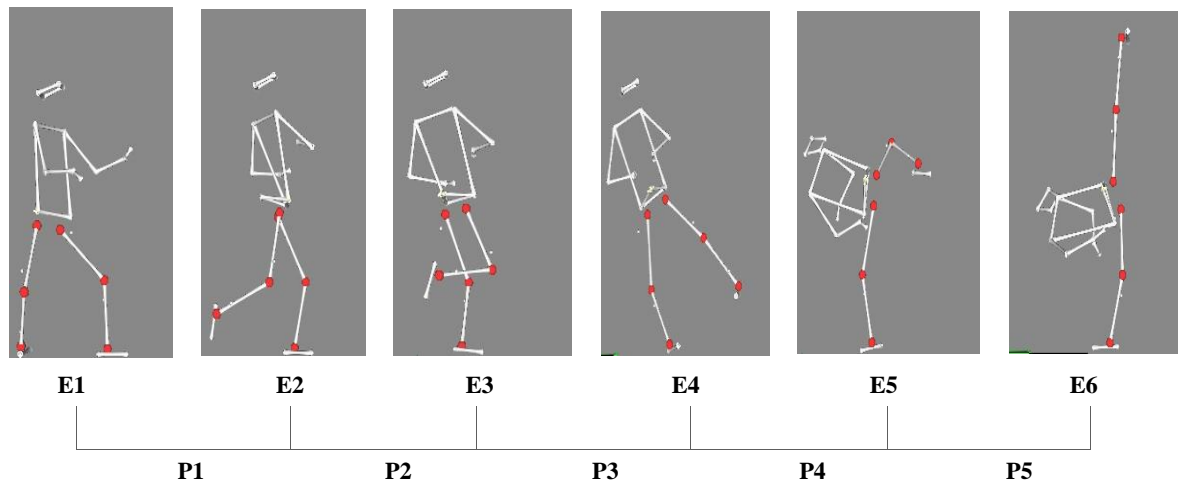
**Table 1.** Participants characteristic. (N =16)

N	Age	Height	Weight	Career
Skilled (8)	20.75 ±1.16	174.25 ±5.82	70.12±6.19	6.50 ±3.34
Unskilled (8)	23.75 ±2.25	170.13 ±2.47	64.62±4.87	0.50 ±0.93

### 2.2. Procedure

This study was carried out in K university exercise room, using 14 digital cameras, and were installed at the left, right, front and rear 45 ° at 5m intervals from the experimenter's position, and the height of each camera was fixed 180cm. The shooting speed of the camera was 300 frames / sec and the shutter speed were 1/250 sec. Before entering the experiment, each subject was asked for consent and explained how to proceed with the experiment. To reduce the errors between the subjects, the subjects removed the tops and wore black tights, and 19 reflective markers were attached to the left and right body joint points and the segment surface. Afterwards, the experimenter could practice enough warm-up and experimental motion to adapt to the experimental environment so that the correct motion could be exhibited. Repeated kicking was performed five times for each subject, and the most accurate and complete movements were selected and analyzed. Analysis section: The motions of the lateral kicks were set to five phases and six sections, and the definition of each was <Figure 1>.

**Figure 1.** Defined phase and event.



### 2.3. Statistical analysis

Data processing: The statistical process of this study calculated the mean and standard deviation ( $M \pm SD$ ) using Excel 2018, and the statistical program (SPSS 22.0, SPSS Inc., Chicago, IL, USA). The Shapiro-Wilk test was conducted to verify the normality of the collected data. Independent t-test was performed to analyze the effects on the kinematic variables according to the kicks of Taekwondo Poomsae athletes and amateur. test and assay (Mann-Whitney U test) were performed and the significance level of all statistics was set to  $\alpha = .05$

## 3. Result & Conclusion

### 3.1. Time variable

As a result of analyzing the time taken Between groups during sidekicks, the results are as follows. The average duration of each skill phase is  $0.49 \pm 0.12$ sec in phase(P1), phase(P2)  $0.16 \pm 0.06$ sec, phase(P3)  $0.12 \pm 0.03$ sec, phase(P4)  $0.19 \pm 0.03$ sec, phase(P5)  $0.16 \pm 0.07$ sec, the average time for each phase of unskilled people is phase(P1)  $0.51 \pm 0.11$ sec, phase(P2)  $0.12 \pm 0.04$ sec, phase(P3)  $0.10 \pm 0.12$ sec, phase(P4)  $0.18 \pm 0.01$ sec, Phase(P5) was  $0.24 \pm 0.08$ sec. All of them showed numerical differences, but not statistically significant. The total execution time of each phase was 1.12sec for the skilled person and 1.15sec for the non-skilled person. In the

biomechanical analysis of the taekwondo poomsae kicking movement of [9], the average athlete group showed an average 0.14sec faster than the non-excellent group. In this study, the skilled group also showed faster overall turnaround time than the unskilled group.

**Table 2.** Lead time by each phase. (Sec)

	Skilled	Unskilled	t/Z	p
P1 <sup>§</sup>	0.49 ± 0.12	0.51 ± 0.11	.0319	.652
P2 <sup>§</sup>	0.16 ± 0.06	0.12 ± 0.04	-1.095	.599
P3 <sup>§</sup>	0.12 ± 0.03	0.10 ± 0.12	-1.400	.062
P4 <sup>§</sup>	0.19 ± 0.03	0.18 ± 0.01	-0.757	.077
P5 <sup>#</sup>	0.16 ± 0.07	0.24 ± 0.08	-1.842	.065

Note: Mean ± SD, #: Mann-Whitney U-test, §: Independent t-test

### 3.2. COM(center of mass)

The results of analysis of body center displacement of left, right(X), front and rear(Y) and vertical(Z) during side kick are as follows. In the center of displacement of left, right(X) and before and after(Y), there was a numerical difference in all sections, but there was no statistically significant difference. The change of body center movement of vertical(Z) was higher in unskilled player ( $0.94 \pm .05$ ) than in skilled player ( $0.81 \pm .10$ cm) in the interval(E6) and showed a statistically significant difference ( $p < .05$ ). Kang [10] reported that kicking and restoring were performed in the main foot with lower COM than the non-injury player. And [11] reported that COM was lowered when the sidekicks was

successful performed. In the vertical variables, we found that when the knee joint of the kick is started, the unskilled group of athletes moves lower than the skilled athlete group and the center position goes down. Past study was also reported that when the foot hits the target, the COM showed the lowest position in both the best athlete's group and the non-elite athletes' group[9]. In this study, it is considered that the skilled group maintains COM closer to the base surface than the unskilled group in the vertical(Z) section E, during side kick, and it will also seem to affect the target height.

**Table 3.** Center of mass. (cm)

		Group	Mean±SD	t/Z	p
X	E1 <sup>§</sup>	Skilled	.06±.06	-.30	.235
		Unskilled	.04±.16		
	E2 <sup>§</sup>	Skilled	-.01±.05	.05	.143
		Unskilled	-.01±.16		
	E3 <sup>§</sup>	Skilled	-.04±.04	.05	.077
		Unskilled	-.04±.16		
	E4 <sup>§</sup>	Skilled	-.06±.04	-.02	.071
		Unskilled	-.07±.16		
	E5 <sup>§</sup>	Skilled	-.09±.05	.15	.096
		Unskilled	-.08±.16		
	E6 <sup>§</sup>	Skilled	-.11±.05	.32	.125
		Unskilled	-.09±.15		
Y	E1 <sup>§</sup>	Skilled	.14±.21	1.77	.111
		Unskilled	.30±.13		
	E2 <sup>§</sup>	Skilled	.36±.22	1.58	.306
		Unskilled	.50±.13		
	E3 <sup>§</sup>	Skilled	.60±.13	1.54	.303
		Unskilled	.46±.23		
	E4 <sup>§</sup>	Skilled	.53±.24	1.41	.268
		Unskilled	.67±.14		
	E5 <sup>§</sup>	Skilled	.65±.25	1.32	.171
		Unskilled	.78±.15		
	E6 <sup>§</sup>	Skilled	.69±.28	1.52	.078
		Unskilled	.86±.17		
Z	E1 <sup>§</sup>	Skilled	.87±.05	.77	.868
		Unskilled	.89±.05		
	E2 <sup>§</sup>	Skilled	.93±.03	-1.93	.429
		Unskilled	.91±.03		
	E3 <sup>§</sup>	Skilled	.97±.03	-1.49	.579
		Unskilled	.94±.04		
	E4 <sup>#</sup>	Skilled	.96±.06	-1.26	.207
		Unskilled	.95±.03		

E5 <sup>#</sup>	Skilled	.92±.11	-1.58	.115
	Unskilled	.99±.03		
E6 <sup>#</sup>	Skilled	.81±.10	-2.2	.027*
	Unskilled	.94±.05		

Note: Mean±SD, #, Mann-Whitney U-test, §, Independent t-test

### 3.3. Lower limb angle results

The results of analysis of hip angle change during side kick are as follows. The change of hip angle in section(E5) was higher in unskilled group ( $71.82 \pm 8.12^\circ$ ) than in skilled group ( $62.03 \pm 6.84$ ) in the left area and showed statistically significant difference ( $p < .05$ ). The change of hip angle in section(E6) was higher in unskilled group ( $57.55 \pm 8.96^\circ$ ) than in skilled group ( $46.45 \pm 5.53^\circ$ ) in the left area and showed statistically significant difference ( $p < .01$ ). [9] said that the hip joint angle decreases when the foot hits the target because the support foot moves the center of the hip joint toward the body to improve the stability of the body and to perform the poomsae kicking close to  $180^\circ$ . The results of the analysis of the changes in the angle of the knee during the side kick motion are as follows. The change in the angle of the knee of the section(E3) showed that the skilled ( $148.98 \pm 9.02^\circ$ ) was higher than the unskilled ( $143.68 \pm 5.13$ ) in the left area ( $p < 0.05$ ). The change in the angle of the joint of the section(E6) showed that the unskilled ( $165.85 \pm 4.45^\circ$ ) was higher than the skilled ( $157.78 \pm 6.18^\circ$ ) in the left area and showed a statistically significant difference ( $p < .05$ ). Hong [12] reported that, the skilled person had maximum left-hand support foot for stable posture as height changes during the next vehicle. The non-skilled person had higher height, so the quality rock-sleeve angle was not maximum. [13] reported that, the angle of the joint of the feet of support must be maximum so that left and right movements can be reduced to maintain balance. In this study, there was a significant difference between the left foot joint(E5) and the left foot joint(E6) of the skilled and unskilled person because the skilled person performed stable and good-looking motions while the car was performing the support foot, but the unskilled person suffered from overpowering hip fall behind. Repeated lateral movement showed differences in the angle of the foot joint in each phase, but no statistically significant difference. The results showed that the characteristics of the poomsae are to balance the feet when hitting the side kick

close to 170 degrees quickly and to maintain the COM close to the base and to support the side kick in order to contribute to the stability of the whole body. We indicated that is correct footing is an important factor in minimizing the next deduction factor. Further studies are needed to analyze the difference between the success and failure of the next kick, the required muscle activity, and the various and instantaneous speed of the center of gravity.

**Table 4.** Lower limb joint angle. (deg)

		Group	Mean±SD	t/Z	p			
Hip	E1	R <sup>§</sup>	Skilled	122.64±11.44	.135	.813		
			Unskilled	123.40±11.25				
		L <sup>§</sup>	Skilled	96.23±9.37			2.011	.157
			Unskilled	107.55±12.87				
	E2	R <sup>#</sup>	Skilled	137.03±5.74	-.840	.401		
			Unskilled	135.39±7.71				
		L <sup>§</sup>	Skilled	109.13±8.85			-.250	.109
			Unskilled	107.78±12.45				
	E3	R <sup>§</sup>	Skilled	114.29±7.36	.420	.508		
			Unskilled	116.24±10.86				
		L <sup>#</sup>	Skilled	121.00±6.27			-.105	.916
			Unskilled	119.84±6.39				
	E4	R <sup>§</sup>	Skilled	95.03±6.69	-1.582	.656		
			Unskilled	90.17±6.69				
		L <sup>§</sup>	Skilled	107.19±12.04			.511	.635
			Unskilled	110.11±10.86				
	E5	R <sup>§</sup>	Skilled	69.54±5.00	-.263	.773		
			Unskilled	68.84±5.54				
		L <sup>#</sup>	Skilled	62.03±6.84			-2.100	.036*
			Unskilled	71.82±8.12				
	E6	R <sup>§</sup>	Skilled	104.98±6.58	.022	.090		
			Unskilled	105.10±13.59				
		L <sup>#</sup>	Skilled	46.45±5.53			-2.521	.012*
			Unskilled	57.55±8.96				
Knee	E1	R <sup>§</sup>	Skilled	128.05±17.56	1.033	.473		
			Unskilled	137.78±20.02				
		L <sup>#</sup>	Skilled	144.40±11.27			-1.680	0.93
			Unskilled	154.12±12.01				
	E2	R <sup>§</sup>	Skilled	129.36±6.98	-.039	.535		
			Unskilled	129.23±6.20				
		L <sup>§</sup>	Skilled	143.34±9.19			-.075	.721
			Unskilled	143.02±7.91				
	E3	R <sup>§</sup>	Skilled	81.99±8.66	1.173	.206		
			Unskilled	89.06±14.67				
		L <sup>§</sup>	Skilled	148.98±9.02			-1.442	.008
			Unskilled	143.68±5.13				
E4	R	Skilled	156.72±12.87	-.068	.192			
		Unskilled	157.12±10.49					
	L <sup>§</sup>	Skilled	153.23±8.90			-2.517	.451	
		Unskilled	142.79±7.62					

Ankle	E5	R <sup>#</sup>	Skilled	65.91±7.52	-1.260	.208			
			Unskilled	75.84±14.82					
		L <sup>#</sup>	Skilled	165.84±6.23			-1.575	.115	
			Unskilled	159.22±9.43					
	E6	R <sup>#</sup>	Skilled	168.87±7.37	.000	1.000			
			Unskilled	163.96±16.66					
		L <sup>#</sup>	Skilled	157.78±6.18			-2.100	.036*	
			Unskilled	165.85±4.45					
	Ankle	E1	R <sup>§</sup>	Skilled	71.06±9.36	1.762			.784
				Unskilled	79.82±10.49				
			L <sup>§</sup>	Skilled	110.40±3.80		.024	.325	
				Unskilled	110.47±6.85				
E2		R <sup>#</sup>	Skilled	109.81±8.97	-.525	.600			
			Unskilled	114.08±9.02					
		L <sup>§</sup>	Skilled	91.18±6.87			.349	.941	
			Unskilled	92.31±6.11					
E3		R <sup>§</sup>	Skilled	95.40±14.16	.514	.349			
			Unskilled	97.64±11.33					
		L <sup>§</sup>	Skilled	95.03±6.69			.815	1.454	
			Unskilled	90.17±6.69					
E4	R <sup>§</sup>	Skilled	91.77±9.74	.546	.804				
		Unskilled	94.52±10.39						
	L <sup>§</sup>	Skilled	89.31±6.52			-.325	.576		
		Unskilled	88.34±5.33						
E5	R <sup>§</sup>	Skilled	85.53±6.79	.233	.321				
		Unskilled	86.61±11.32						
	L <sup>§</sup>	Skilled	113.08±5.56			-3.361	.762		
		Unskilled	101.92±7.55						
E6	R <sup>§</sup>	Skilled	85.66±6.45	-1.785	.074				
		Unskilled	94.31±13.34						
	L <sup>§</sup>	Skilled	118.21±4.32			-2.030	.400		
		Unskilled	112.83±6.12						

Note: Mean±SD, #: Mann-Whitney U-test, §: Independent t-test

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## A Proposal to Make Use of TAEKWONDO Studio for the Sake of Teenager Health Improvement

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### Abstract

50~60 percent of factors which determine health are conditioned by everyday habits. The WHO(World Health Organization) recommend for children and teenagers aerobic activities and physical activities for the strengthening of muscles and bones amounting to more than 60 minutes per day. However, upon analyzing the physical exercises of boys and girls between 11 and 17 in 146 nations, 81.1 percent was found lacking the amount of exercise recommended by WHO, and Korean students lacking exercise was found to be 94.2%, the highest among 146 countries, in the "worst" category, which shows a serious deficiency of exercise among Korean students internationally.

A lack of exercise leads to numerous problems, ranging from overweight-ness, obesity and teenage scoliosis. Scoliosis in particular has no clear prevention method so early detection and treatment due to school screening are the only solution, and through early detection 63 percent of scoliosis which range up to more than 40 degrees can be cured.

Taking into consideration the nature of scoliosis in teenagers in their period of growth, a functional training program effective in improving its symptoms through schools or regional facilities, rather than appliances or surgical methods, is necessary.

In order to improve the problem of the lack in teenager exercise, an encouragement for physical activities in general and the inducing of behavioral changes are important. After-school programs regarding health run by schools, or the supplying of exercise programs for prevention in approximately 11,000 Taekwondo Studio within Korea, can lead to the formation of exercise programs which is easily accessible by students themselves. By offering an affective functional exercise at an appropriate time, recognition on the importance of health care on the part of students can happen, information can be provided, and these can be used as means of prevention and improvement.

**[Keywords]** Taekwondo Studio, Teenagers, Health Improvement, Scoliosis, Obesity

## 1. Preface

### 1.1. The need for research

In the extent that a healthy body must be maintained and bodily energy improved, we in the past often emphasized that "health is our nation's strength" and that "in a sound body is a sound mind". But with the development of information technology and rapid growth of cultural factors, in our generation

we only move our eyes and fingers, which led to the bodily health being dismissed as unimportant.

50 to 60 percent of the factors which determine health are reported to be decided by the type of posture in everyday life[1], and WHO recommends more than 60 minutes of aerobic exercises and activities for the strengthening of muscle and bone in the case

**Table 1.** Low level students per city and province.

Year	Name of City or Province	Seoul	Busan	Daegu	Incheon	Gwangju	Daejeon	Ulsan	Saejong	Gangwon
'16	Ratio of students at 4~5 level	8.0	5.7	3.6	10.8	6.3	12.5	4.5	9.5	13.7
	Name of City or Province	Gyeonggi	Chungbuk	Chungnam	Jeonbuk	Jeonnam	Gyeongbuk	Gyeongnam	Jeju	Total
	Ratio of students at 4~5 level	12.3	12.3	11.1	12.2	8.0	6.8	7.9	7.4	9.46
Year	Name of City or Province	Seoul	Busan	Daegu	Incheon	Gwangju	Daejeon	Ulsan	Saejong	Gangwon
'15	Ratio of students at 4~5 level	8.0	5.2	3.9	8.2	6.0	10.3	4.8	8.9	17.6
	Name of City or Province	Gyeonggi	Chungbuk	Chungnam	Jeonbuk	Jeonnam	Gyeongbuk	Gyeongnam	Jeju	Total
	Ratio of students at 4~5 level	11.8	11.7	10.1	12.3	7.3	7.1	6.8	7.2	8.94

of children and teenagers. However, upon analyzing the body activity statistics among boys and girls between 11 and 17 among 146 nations in 2016, 81.1 percent had deficiency in the physical activities and did not meet the level of WHO recommendation, and 94.2 percent of Korean students among them were lacking exercise, the highest among the 146 nations. Especially among girls, 97.2 percent were found to not exercise at all, and technically all of them were found not committing to body activity sufficient for the maintaining of mental and bodily health. Thus, the Korean teenager's situation was found to be in the "worst" category, and their exercise deficit was found to be a serious problem.

For individual's happiness in the future and the continual development of the nation, bodily health and a sound mind must be fostered, and this is a task which the nation and schools together must take responsibility for, and is not optional now but a must.

Considering the attributes of teenagers in their growth season, the health improvement of children of age for school through conservative treatment, taking use of schools or local facilities, are keenly needed, rather than chemical and surgical methods. However, the programs and institutions related to functional training in group form is lacking.



## 1.2. The aim of this research

The present research primarily aims to offer a directional guide for policies related to health improvement through general encouragement for physical activities and behavioral changes using school's health classes and Taekwondo Studio, to tackle the problem of a teenager exercise deficiency.

## 2. The Improvement Measures for Teenager Health

### 2.1. The expanding of health/fitness classes

Lack of exercise can lead to numerous problems, and according to the Physical Activity Promotion System(PAPS) can cause overweight-ness, obesity, a low energy level and teenage year scoliosis. Also, lack of physical activity in teenage years in which one is sensitive to change of appearance and the muscular and bone systems grow radically, not only threatens health but can cause irregularities in the bone and muscular system and various ailments.

It is a serious problem that health and body energy level are failing rather than advancing at a time when physical activity must be most fervent, and due to our education system which focuses on college preparation and rivalry, grade 1, the best level, is tending to decrease and the level 5, the poorest, is tending to increase. Thus, I have proposed "School Physical Education Improvement Law" which focuses on increasing the members of Health and Physical Ability Classes for students so it would constitute of ordinary students and expanding the body ability examination which is conducted from 5th grade on to below 3rd grade.

### 2.2. Exercises and posture for teenage scoliosis

In 2008, according to the recorded population, 380 thousand children and teenagers among 7.8 million total has received treatment due to spinal symptoms, which were the most common ailments after cold, in which low back pain, a form of Muscular and

skeletal system nitrification, constitutes 29.0%, and scoliosis 13.5 %. Scoliosis often occurs in growing children[2].

Scoliosis is a disease in which the spinal cord curves and twists to the side, and the scoliosis which occurs in youths before and after 10 years of age are mostly structural scoliosis. It is assumed that the irregularities in the nerve system and hormone which connects cranial nerves and spinal muscles is very likely the cause but often no special cause is found, and such a structural scoliosis is categorized as idiopathic, taking up 85% of all scoliosis cases[3].

According to the Health Insurance Service(2000), students in their growth season suffer from the malalignment of the body due to an overwhelming academical load and wrong postures, and there is an increasing amount of cases in which they are treated for the failing of muscular function and academic abilities, and also lower back pain. The underlying cause for scoliosis is thought to be mental stress related to academics, long hours of computer usage in an inappropriate posture, the chairs and desks which is not suited for body size, heavy backpacks, and a lack of exercise[4]. It was said that an opportunity for education and the taking of certain measures were needed for teens[5].

The teenage years are when bones and muscular systems grow rapidly, and so this problem cannot be overlooked, and the irregularities and ailments of muscle and bone structure and spinal anomalies has an intimate relationship with the amount of exercise and life habits. Unless health care is actively done from a young age on, these may lead to various ailments after the student's becoming a grown up, resulting in social and economic costs and affecting life quality negatively due to loss of a desire to do better and also confidence[6].

### 2.3. The early discovery of scoliosis and exercise

The stability of the spinal posture is related to three systems: bone and ligament, muscle, and nerve systems. If there is any imbalance

in any one among the three, it will affect the stability of all[7].

Scoliosis does not have a clear prevention method so the only solution is early discovery and treatment through school screening[8]. Also, according to Malmo General Hospital in Sweden, the level of scoliosis over 40 degrees can be reduced by 63 percent through early discovery[9].

The research on the frequency of Scoliosis occurrence and early detection which started in Minnesota, USA in 1947, through a mass examination in a school, received attention from 1960 on; school screening is now being done obligatorily in 21 states(Morrissy, 1999). The School Health Management of Korea specifies that examinations on spinal anomalies be done for the early detection and prevention of scoliosis. The School Health Association examines whether the spine curves in a desirable way by the chest radiograph to check for tuberculosis for first years in middle school(7th grade) and first years in high school(10th grade). While checking for scoliosis through chest photographs cannot detect the arc of the lower back, it can find chest curves, and as for students who is found to have anomalies according to its result, they are instructed to undergo a detailed examination in school health centers or professional medical organizations, and allow them to be surveyed and treated accordingly.

For students, who are undergoing a period in which habits form, the activities and posture midst their growth season affects the bone structure which sustains the body, and school is where students can be trained to have the right posture[10].

Exercise therapy for teenagers with scoliosis causes about 70% of the symptoms disappearing, and body correction was also possible by about 50% percent[11]. For scoliosis of teenagers who still has spinal growth, an exercise program needs to be done periodically, continuing in tandem with domestic education, and with care from the people around

Brooks et al.,(1975); Rogalaet al.,(1978) emphasized the importance of early detection[12][13]., and that the physical activities

which goes in hand with regular instruction on posture can lessen the rate of teenage scoliosis[14]. And as for mild symptoms, even the early detection induces a sense of caution, and improvement of symptom and correction are reported. Due to efforts to correct one's posture after having been diagnosed with scoliosis, a Hawthorne Effect was observed, not to mention the concerned monitoring of parents, and attention paid to physical exercise and bodily activity.

In early young adulthood in which growth continues rapidly, the possibility for advances is quite high, unlike as is the case for grown-ups. Early detection leading to posture correction and exercise therapy can prevent the spine's shift and prevent complications, and is being mentioned as a major issue of the school health system[15].

Considering the character of scoliosis in growing teens, it is important to not depend on appliances and surgeries but prevent and treat student's scoliosis due to lack of exercise through the education of an instructor in school or regional facilities. Also, the establishing of a preventive exercise program effective in improvement is much desired, and a functional training in groups is needed. However, according to the participation in Korean Council of Sports for All, while 80.7 percent responded positively on the health and bodily capacity maintenance effect, due to lack of time(50.8%), the cost and lack of information and the need for a person to accompany, participation in physical activities could not be done. Our citizens show an exercise participation rate which does not suit the "Global Recommendation on Physical Activity for Health" by the WHO[16].

The management of health and bodily capacity is crucial not only for happy school days, but in that it fosters the basic bodily energy on the course of becoming a grown up, and working measures are needed for students to be able to know objectively and care about their health and energy, and take care of themselves consistently.

Due to the effect of functional exercises in school or in a regional facility, the bodily activity and the education in posture

straightens the spinal cord, leading to the improvement of under-activated muscles such as spinal root muscles and the relaxation of muscles overtly used, aiding in curing obesity, low body energy, and irregularities in body form. These measures must be conducted more regularly and consistently on students who are of an age when there is rapid growth.

### 3. Conclusion and Suggestion

The WHO counted a highly competitive academic environment, technological advancements and the electronic revolution as the reasons for teen exercise deficit not improving too easily, since it caused the teens to sit in longer intervals.

According to the Survey on Participation in National Sports, the considerations for increase in physical activity participation must be preceded by the securing of various gymnastic facilities in close distance, the development of public gym facilities and usage activation. For a scientific managing of the body, efforts on the level the country and regional organizations rather than the individual must be made, and in order to improve the problem of teen exercise deficit, the general encouragement for bodily activity and inducing of behavioral changes are needed.

For students of milder symptoms who do not need hospital treatment, running a health class for students in their growth season as an after school activity or supplying exercise programs in 11 thousand Taekwondo Studio in the country for prevention, can serve solutions. Taekwondo is a cultural content representing Korea with the number of its trainees increasing explosively in and out of the country. With the training system for kids at the main, it is being reincarnated as an every day sports which all citizens can enjoy. A Taekwondo Studio has long served private exercise facilities in regions, and it is expected that programs everyone can enjoy, instructors and a space for training would be provided, and programs for the treating of obesity, low energy level and body distortion can be offered, which will lead to positive outcomes.

The discovery of obesity, low energy level and scoliosis through the school's health evaluation and spinal cord inspection, the offering of exercise programs the student can easily access, the constitution of a program with adequate time, cost and environment in which many can take part, and the offering of effective functional exercises at an appropriate time, will result in the students being mindful of health management, providing information, and taking use of them as ways of prevention and improvement.

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