

Available online at: <http://journal.unj.ac.id/unj/index.php/gjik>  
Gladi: Jurnal Ilmu Keolahragaan 15 (01) 2024, 80-94  
Permalink/DOI: <https://doi.org/10.21009/GJIK.151.08>

## THE INFLUENCE OF SPEED ENDURENCE, LEG LENGTH, AND ACHIEVEMENT MOTIVATION ON THE ACHIEVEMENT OF INDONESIAN JUNIOR TAEKWONDO ATHLETES IN 2023

Mugiyanto<sup>1</sup>, Fahmy Fachrezzy<sup>2</sup>, Oman Unju Subandi<sup>3</sup>

<sup>123</sup> Physical Education, Jakarta State University Postgraduate, Jakarta State University Complex M. Hatta Building Jl. Rawamangun Muka, East Jakarta, Indonesia 1322

Corresponding author. Email : [giyan.co16@gmail.com](mailto:giyan.co16@gmail.com)

(Submission Track: Received: 09-08-2023, Final Revision: 01-01-2024, Available Online: 31-03-2024)

**Abstract.** The purpose of this study was to determine and reveal whether or not there is an influence between speed endurance, leg length, and achievement motivation on the achievement of Indonesian taekwondo junior athletes in 2023. This research was carried out using a quantitative approach using the survey method with path analysis techniques. The population in this study were all Indonesian taekwondo junior athletes. By taking the sample using the total sampling technique where the sample used is all of the population, namely all members of Indonesian junior taekwondo athletes because in the research that will be carried out because the population is considered smaller or less than 100. Based on the results of data analysis and hypothesis testing from research data variable speed endurance, leg length, motivation and achievement results of Indonesian taekwondo junior athletes, the following conclusions can be drawn: There is an effect of speed endurance on motivation with a direct influence percentage of 49.3%. There is an effect of leg length on motivation with a direct influence percentage of 39.5%. There is an effect of speed endurance on the achievement results of Indonesian junior taekwondo athletes with a direct influence percentage of 21.3%. There is an effect of leg length on the achievement of Indonesian junior taekwondo athletes with a direct influence percentage of 19.9%. There is a motivational influence on the achievement of Indonesian junior taekwondo athletes with a direct influence percentage of 58%. There is an indirect effect between speed endurance on the achievement results of Indonesian junior taekwondo athletes through motivation with a significance value of 0.468. There is an indirect effect between leg length on the achievement of Indonesian junior taekwondo athletes through motivation with a significance value of 0.428.

**Keywords:** speed endurance; leg length; motivation; taekwondo



## **INTRODUCTION**

The implementation of DBON includes 14 sports that are targeted for the Olympics, details of the 14 sports are badminton, weightlifting, rock climbing, archery, shooting, wushu, karate, taekwondo, bicycle racing, athletics, swimming, rowing, artistic gymnastics, and martial arts. Of the several sports that are the focus of Presidential Decree No. 86 of 2021 concerning the Grand Design of Sports, one of which is Taekwondo.

Currently Taekwondo has members in around 160 countries (Son et al., 2020). This martial sport is practiced by more than 40 million people worldwide (Bing & Kim, 2021). Taekwondo was formed in 1954 based on the results of the refinement of a combination of various traditional martial arts in Korea (M. Kim et al., 2021). At the beginning of the 1970s, the development of Taekwondo in Indonesia has experienced quite good development (Choi et al., 2013). This is evidenced by the large number of people who participate in this sport originating from Korea, such as the establishment of Taekwondo practice sites in various schools, in elementary schools (elementary schools), junior high

schools (junior high schools), high schools (high schools), universities, to government agencies and also in other public places (H. B. Kim et al., 2016).

Taekwondo martial arts have beautiful and practical movements to use such as spinning kicks with head targets (Johnson, 2018).

Even though taekwondo movements can kill opponents, in taekwondo matches there are various protective equipment to avoid things that are dangerous, such as protectors in the head area, body area to other vital areas (Moenig & Minho, 2016).

Kyorugi number is a one-on-one fight in the arena using permitted techniques, and techniques that are considered valid if the kick technique used hits a permissible target and is carried out using the part below the ankle bone (back of the sole of the foot or in the Korean term "baldeung", base heel "dwichuk", rear heel "dwikumchi", inner sole of the foot "balbadak") (Yılmaz, 2021). To get taekwondo points, you must hit the permitted target hard so that it has an effect on the opponent who is hit by the kick (H.-Y. Kim & Choi, 2021). Poomsae numbers are artistic numbers that demonstrate movements in taekwondo. each athlete tries to play one

or two moves in turn and where the athlete who succeeds in having the highest accumulated value will be the winner (Cha, 2021). For example, the perfection of good technical movements in a match will certainly add value so that you can win (Lu et al., 2017).

The match is quite long and draining, so it requires good endurance, because with good endurance, a taekwondo poomsae athlete can maintain performance during the match (Kwak & Yang, 2021). Besides that, because there are quite a lot of taekwondo moves, a taekwondo athlete requires a high level of concentration in order to memorize these moves properly and correctly (Lim et al., 2022).

Seeing the definition of Taekwondo sport above, of course for an athlete to excel in Taekwondo sport there are several things that support it (Moenig et al., 2021). To train techniques and tactics, it takes a long time to make these movements perfect and become the correct reflexes when done both during practice and competition (Ureña et al., 2020). According to Sajoto (1995: 2), there are several determinants of achievement that are no less important, namely supporting aspects including high-quality trainers, programs that are

systematically arranged, awards from the community and government, adequate funds, and an orderly organization (Uribe et al., 2021).

Factors that need special attention are physical condition factors, because physical condition factors are one of the supporting factors in every achievement in any sport including Taekwondo (Sáez et al., 2020). Physical conditions must really be considered early to support basic technical skills so that they can develop the quality of the game which is one of the factors that determines the win or loss of an athlete in a competition (Rydzewska et al., 2021).

Many of the coaches have not paid much attention to the importance of the physical condition of the athletes in a match due to the fact that the coach rarely tests the physical condition of athletes to see the development of the athlete's physical condition from the exercises that have been carried out (Bhattacharya et al., 2014). The coach should always control the athlete's physical condition, so that it can be known early on if the players experience interference which will later affect the performance and performance of these

players in competition (Martínez-Martínez et al., 2020).

The limbs of each individual have different sizes so that it affects the difference in running speed of each individual. The longer a person's legs allow a person to go longer and more efficiently in covering the distance that is contested (Maes et al., 2017).

Thus, to get a good run, supporting factors are needed, one of which is the explosive power of the leg muscles (Jacob et al., 2020).

The explosive power of the leg muscles is the ability of the leg muscles to carry out coordinated movements to carry out various activities, especially those using the legs (Nugraha & Ohara-Hirano, 2014). Strength here is defined as the ability of a muscle or group of muscles to overcome loads, both loads in the sense of the body itself and loads in the sense of objects or tools that are moved by the body (José Enrique et al., 2021). Therefore, to support good athlete performance, speed endurance, leg length, and good achievement motivation are needed (Adams et al., 2020). These three things seem to be interconnected with each other to produce good performance to produce victory in a match.

## **METHOD**

This research was carried out with a quantitative approach using survey methods with path analysis techniques. Quantitative research is a method for testing certain theories by examining the relationships between variables (Sugiyono, 2012). The goal of quantitative research is to discover knowledge or perform a deductive hypothesis test (Guo, 2014). Path analysis technique or often referred to as path analysis is the relationship of influence between independent variables, intervening variables and dependent variables where researchers clearly define that a variable will be the cause of other variables which are usually presented in the form of diagrams (Noor, 2011). According to Paul Weibly path analysis is the development of a direct form of multiple regression with the aim of providing an estimate of the importance and significance of a hypothetical causal relationship in a set of variables. (Dr. Supardi U.S., MM., 2013).

## **RESULT AND DISCUSSION**

Based on data obtained from data processing using descriptive statistical techniques, data descriptions are obtained in the form of minimum values,

maximum values, mean, median, mode, standard deviation and variance. From these data a frequency distribution table of each research variable was made and a histogram graph was made.

**a. Variable Data Description Achievement results of junior athletes (Y)**

The results of the research on the junior athlete achievement variable (Y) have an average score of 79.5, the highest score is 100 and the lowest score is 70, the standard-deviation is 10.98, the variance is 120.66, the mode is 70, the median is 80 Based on the results of these calculations, the frequency distribution can be seen in Table 1. below this:

**Table 1.**  
**Variable Frequency Distribution of Achievement in Junior Athletes (Y)**

Interval Class	Absolute Frequency	Relative Frequency
70-74	23	47%
75-79	0	0%
80-84	12	24%
85-89	0	0%
90-94	7	14%
95-99	0	0%
100-104	7	14%
	49	100%

**b. Deskripsi Data Variabel Speed Endurance (X<sub>1</sub>)**

The research results for the Speed Endurance (X<sub>1</sub>) variable have an average value of 62.57, the highest value is 73 and the lowest value is 53, the standard deviation is 5.21, the variance is 27.10, the mode is 60, the median is 63. Based on As a result of these calculations, the frequency distribution can be seen in table 2 below:

**Table 2.**  
**Speed Endurance Variable Frequency Distribution (X<sub>1</sub>)**

Interval Class	Absolute Frequency	Relative Frequency
53-55	3	6%
56-58	9	18%
59-61	12	24%
62-64	7	14%
65-67	6	12%
68-70	9	18%
71-73	3	6%
	49	100%

**c. Description of Leg Length Variable Data (X<sub>2</sub>)**

The results of the research on the limb length variable (X<sub>2</sub>) have an average value of 86.60, the highest value is 95.4 and the lowest value is 81, the standard deviation is 3.27, the variance is 10.67, the mode is 87, the median is 86 ,7. Based on the results of these calculations, the frequency distribution can be seen in table 3. below this:

**Table 3.**  
**Variable Frequency Distribution of Leg Length (X<sub>2</sub>)**

Interval Class	Absolute Frequency	Relative Frequency
81-83	7	14%
83,1-85,1	10	20%
85,2-87,2	13	27%
87,3-89,3	12	24%
89,4-91,4	3	6%
91,5-93,5	2	4%
93,6-95,6	2	4%
	49	100%

**d. Motivation Variable Data Description (X<sub>3</sub>)**

The results of the research variable Motivation (X<sub>3</sub>) have an average value of 141.45, the highest value is 157 and the lowest value is 135, the standard deviation is 5.67, the variance is 32.17, the mode is 139, the median is 139. Based on the results With this calculation, the frequency distribution can be seen in table 4. below this:

**Table 4.**  
**Motivation Variable Frequency Distribution (X<sub>3</sub>)**

Kelas Interval	Frekuensi Absolut	Frekuensi Relatif
133-136	6	12%
137-140	22	45%
141-144	10	20%
145-148	4	8%
149-152	3	6%
153-156	3	6%
157-160	1	2%
	49	100%

**Hypothesis Test**

After the structural model analysis is carried out, the results obtained are used to test the proposed hypotheses and measure the percentage of direct and indirect influence between variables. Conclusions on the proposed hypothesis will be drawn through the path coefficients and significance for each path examined. By looking for the R square value in the model summary table to get the overall effect of each substructural, the F value and significance value in the Anova table for hypothesis testing and residual values then the significance value and beta coefficient in the coefficients table to get the significance value of the influence between variables using the SPSS application version 26.

**Substructural Testing 1**

**Table 5.**  
**Substructural Summary Model 1**

Model summary	Anova <sup>a</sup>
R (0.715)	F (24.054)
R square (0.511)	Sig. (0.00)
Adjusted R Square (0.490)	Df (2)

The purpose of substructural testing 1 is to test the hypothesis by looking at the direct effect of speed endurance (X<sub>1</sub>) on motivation (X<sub>3</sub>) and the direct effect of leg length (X<sub>2</sub>) on

motivation ( $X_3$ ) with the equation  $X_3 = PX_3X_1 + PX_3X_2 + e_1$ . The following is a substructural summary model table 5.

From the results of the substructural test 1 using SPSS, the R Square value in the model summary table is the total effect of speed endurance ( $X_1$ ) and leg length ( $X_2$ ) together and directly on motivation ( $X_3$ ), which is equal to  $0.511 \times 100\%$ , so the percentage the total effect of substructural 1 is as much as 51.1% the influence of the two variables speed endurance ( $X_1$ ) and leg length ( $X_2$ ) together and directly on motivation ( $X_3$ ) and the remaining 48.9% by other variables not examined as influence on motivation. Error value ( $\varepsilon_1$ ) of results  $e_1 = \sqrt{1 - r^2} = 0.699$ .

Based on table 4.10 data, an F value of 24,054 is obtained with a significance value of 0.000. Therefore  $0.000 < 0.05$ , the research hypothesis which states that there is an influence between speed endurance and leg length on motivation is accepted.

**Tabel 6.**  
**Substructural Coefficient 1**

Model	Stand. Coef.	t	Sig
Speed endurance	.439	3.768	0.00
Leg length	.395	3.388	0.01

Based on the path analysis test, the substructural equation 1 is obtained  $X_3 =$

$PX_3X_1 + PX_3X_2 + e_1$  become  $X_3 = 0,439 X_1 + 0,395 X_2 + 0,699 e_1$ .

**Structural Model Testing 2**

Tests on structural model 2, namely the variables speed endurance ( $X_1$ ), leg length ( $X_2$ ), motivation ( $X_3$ ) on achievement results (Y) in Indonesian junior taekwondo athletes.

**Table 7.**  
**Model Summary Substruktural 2**

Model summary	Anova <sup>a</sup>
R (0.868)	F (45.907)
R square (0.754)	Sig. (0.00)
Adjusted R Square (0.737)	Df (3)

From the results of the 2nd substructural test using SPSS, the R Square value in the model summary table is the total effect of speed endurance ( $X_1$ ), leg length ( $X_2$ ), and motivation ( $X_3$ ) together and directly on the athlete's achievement (Y) junior taekwondo Indonesia, which is equal to  $0.754 \times 100\%$ , the total percentage of substructural influence 2 is as much as 75.4%, the influence of the two variables speed endurance ( $X_1$ ), limb length ( $X_2$ ), and motivation ( $X_3$ ) together and directly on the results achievement (Y) of Indonesian taekwondo junior athletes and the remaining 24.6% by other variables not examined as an influence on the achievement results of Indonesian taekwondo junior athletes (Y).

Based on the ANOVA table data, an F value of 45.907 is obtained with a significance value of 0.000. Therefore  $0.000 < 0.05$ , the research hypothesis which states that there is an influence between speed endurance, leg length, and motivation on achievement results is accepted. The following table substructural coefficient 2:

**Tabel 8.**  
**Substructural Coefficient 2**

Model	Stand. Coef.	t	Sig
Speed endurance	.213	2.228	0.031
Leg length	.199	2.129	0.039
motivation	0.580	5.478	0.000

From the table of coefficients above, it can be seen that the significance value in the sig. for the influence of the variable speed endurance ( $X_1$ ) on achievement results (Y) junior taekwondo athletes in Indonesia has a value of  $0.031 < 0.05$ , then testing the hypothesis states that there is a direct effect between speed endurance ( $X_1$ ) on achievement results (Y) athletes Indonesian taekwondo junior accepted. For the variable leg length ( $X_2$ ) on achievement results (Y) for Indonesian taekwondo junior athletes it has a value of  $0.039 < 0.05$ , so testing the hypothesis states that there is a direct effect between leg length ( $X_2$ ) on achievement results

(Y) for Indonesian taekwondo junior athletes accepted.

For the motivational variable ( $X_3$ ) on achievement results (Y) for Indonesian junior taekwondo athletes (Y) has a value of  $0.000 < 0.05$ , then testing the hypothesis states that there is a direct influence between motivation ( $X_3$ ) on achievement results (Y) for junior taekwondo athletes Indonesian accepted.

Based on the path analysis test, the substructural equation 2 is obtained  $Y = PYX_1 + PYX_2 + PYX_3 + e_2$  become  $Y = 0,213 X_1 + 0,199 X_2 + 0,580 X_3 + 0,495 e_2$ .

The results of the path analysis test show that there are two substructural equations with a value for substructural 1:  $X_3 = 0,439 X_1 + 0,395 X_2 + 0,699 e_1$  and for substructural equation 2 is:  $Y = 0,213 X_1 + 0,199 X_2 + 0,580 X_3 + 0,495 e_2$ .

## DISCUSSION

### 1. The results showed that there was an effect of speed endurance on achievement motivation in Indonesian taekwondo junior athletes

Based on the results of the coordination variable analysis test on speed endurance, the path coefficient  $P_{31} = 0.493$  with a  $Sig. = 0.000/2 =$



$0.000 < \alpha = 0.05$ , so that H1 accepts and Ho is rejected. That is, there is a direct effect of speed endurance on achievement motivation in Indonesian taekwondo junior athletes. Based on these results, the magnitude of the direct effect of speed endurance on achievement motivation in Indonesian taekwondo junior athletes is 49.3%, while the rest are other factors not explained in this study.

**2. The results showed that there was a direct effect of leg length on achievement motivation in Indonesian taekwondo junior athletes**

Based on the test results of the variable analysis of the speed of reaction to the length of the limbs, the path coefficient  $P32 = 0.395$  with a value of  $\text{Sig.} = 0.001/2 = 0.005 < \alpha = 0.05$ , so that H1 accepts and Ho is rejected. That is, there is a direct effect of leg length on achievement motivation in Indonesian taekwondo junior athletes. Based on these results, the magnitude of the direct influence of leg length on achievement motivation in Indonesian taekwondo junior athletes is 39.5%, while the rest are other factors not explained in this study.

**3. The results showed that there was a direct effect of speed endurance on**

**the achievement of Indonesian junior taekwondo athletes**

The effect of speed endurance on the achievements of Indonesian junior taekwondo athletes is 21.3%. While the remaining 78.7% is influenced by other factors. So it can be concluded that there is an effect of speed endurance on the achievement results of Indonesian junior taekwondo athletes. Taekwondo is very different from many other martial arts because taekwondo's dynamic and active movements require a dominant physical component. Several studies have shown that taekwondo requires either aerobic physical fitness or endurance to be developed (Bouhlej, 2006); (Matsushigue, 2009).

Because Speed endurance plays a role in keeping the athlete's kick movements consistent during the game. Therefore, to improve performance in taekwondo, the development of taekwondo technical skills and their quality depends on functional and physical preparation (Haddad, 2014).

Based on the results of the research conducted, that there is a direct effect of Speed Endurance on the achievement results of Indonesian junior taekwondo athletes with the results of the path coefficient  $Py1 =$

0.213 with a value of Sig. = 0.031 <  $\alpha$  = 0.05. It turns out that Speed Endurance has a direct and significant effect on the achievements of Indonesian junior taekwondo athletes.

#### **4. The results showed that there was a direct effect of leg length on the achievement of Indonesian taekwondo junior athletes**

The effect of leg length on the achievement of Indonesian junior taekwondo athletes is 19.9%. While the remaining 80.1% is influenced by other factors. So it can be concluded that there is an influence of leg length on the achievement results of Indonesian junior taekwondo athletes. The physical elements that support taekwondo kicks are leg length and speed. Leg length affects the kick result and produces a high frequency within the allotted time so athletes can get points when competing (Firman Maulana, Zikrur Rahmat & Irvandi, 2020).

Based on the results of the research conducted, there is a direct effect of leg length on the achievement of Indonesian taekwondo junior athletes with the path coefficient  $Py_1 = 0.199$  with a value of Sig. = 0.039 <  $\alpha$  = 0.05. It turns out that leg length has a direct and significant effect on the achievement

results of Indonesian junior taekwondo athletes.

#### **5. Hasil penelitian menunjukkan terdapat pengaruh langsung motivasi terhadap hasil prestasi atlet junior taekwondo Indonesia**

The effect of motivation on the achievement of Indonesian junior taekwondo athletes is 58%. While the remaining 42% is influenced by other factors. So it can be concluded that there is a motivational influence on the achievement results of Indonesian taekwondo junior athletes. In addition to physical elements, the quality of taekwondo athletes is influenced by psychology, among others, influenced by factors of motivation, tension, anxiety, concentration and attention (Firman Maulana, Zikrur Rahmat, & Irvandi, 2020). The results of this study are in line with research conducted by Primary (2019) which proves that motivational variables affect achievement. Motivation gives encouragement to athletes to be more active and work hard by using the abilities and skills possessed by these athletes to achieve an achievement (Azhimi, Sulastri, Alman Hudri, 2021).

Based on the results of the research conducted, that there is a direct influence of motivation on the

achievement results of Indonesian taekwondo junior athletes with the results of the path coefficient  $Py_1 = 0.580$  with a  $Sig. = 0.000 < \alpha = 0.05$ . It turns out that motivation has a direct and significant effect on the achievements of Indonesian taekwondo junior athletes.

**6. The results showed that there was an indirect effect of speed endurance through motivation on the achievement of Indonesian junior taekwondo athletes**

From the results of the research data analysis, the significance value of speed endurance through motivation was obtained for the achievements of Indonesian junior taekwondo athletes of  $0.468 > 0.00$ . This shows that there is an indirect effect of speed endurance on the achievement of Indonesian junior taekwondo athletes through motivation. Wiarto (2013) explained that endurance is a person's ability to do work for a relatively long time. Endurance according to Sajoto explains that a person's ability to use the heart system of blood circulation effectively and efficiently in carrying out work continuously which involves the contraction of a number of large

muscles with high intensity in a long time (Yulinar & Kurniawan, 2018).

The results of this study show that Indonesian taekwondo junior athletes who have good speed endurance can certainly kick quickly and not get tired easily supported by a high level of achievement motivation. Good and correct motivation will provide good performance for an athlete, because motivation itself is something that can make someone do something to achieve the desired goal or desired achievement (Azhimi, Sulastrri, Alman Hudri, 2021).

Based on the results of the research conducted, it can be concluded that this research can be accepted empirically. The rationale that has been described in the conceptual framework can be tested in real terms.

**7. The results showed that there was an indirect effect of leg length through motivation on the achievement of Indonesian taekwondo junior athletes**

From the results of the research data analysis, the significance value of leg length through motivation was obtained for the achievement of Indonesian taekwondo junior athletes of  $0.428 >$

0.00. This shows that there is an indirect effect between leg length on the achievement of Indonesian taekwondo junior athletes through motivation.

The results of this study found that Indonesian taekwondo junior athletes who have long legs will be able to do a better range of kicks supported by a high level of achievement motivation. Motivation is as a driving force that changes the energy in a person through motivation into a form of real activity to achieve certain goals in the target (Yudabbirul Arif et. Al, 2019).

Based on the results of the research conducted, it can be concluded that this research can be accepted empirically. The rationale that has been described in the conceptual framework can be tested in real terms.

## **CONCLUSION**

Based on the results of data analysis and hypothesis testing from the research data variable speed endurance, leg length, motivation and achievement results of Indonesian taekwondo junior athletes, the following conclusions can be drawn:

1. There is an effect of speed endurance on motivation with a direct influence percentage of 49.3%.
2. There is an effect of leg length on motivation with a direct influence percentage of 39.5%.
3. There is an effect of speed endurance on the achievement results of Indonesian junior taekwondo athletes with a direct influence percentage of 21.3%.
4. There is an effect of leg length on the achievement of Indonesian junior taekwondo athletes with a direct influence percentage of 19.9%.
5. There is a motivational effect on the achievements of Indonesian junior taekwondo athletes with a direct influence percentage of 58%.
6. There is an indirect effect between speed endurance on the achievement results of Indonesian junior taekwondo athletes through motivation with a significance value of 0.468.
7. There is an indirect effect between leg length on the achievement of Indonesian taekwondo junior athletes through motivation with a significance value of 0.428.

## **REFERENCES**

- Adams, E. M., Williams, K. A., Olsen, B. J., & Evers, D. C. (2020).

- Mercury exposure in migrating songbirds: correlations with physical condition. *Ecotoxicology*.  
<https://doi.org/10.1007/s10646-020-02190-8>
- Azhimi, Sulastri, & Hudri, A. (2021). *PENGARUH MOTIVASI DAN DISIPLIN LATIHAN TERHADAP PRESTASI ATLET TAEKWONDO DI KABUPATEN OGAN ILIR*. 20(1), 13–20.
- Bhattacharya, R., Shen, C., & Sambamoorthi, U. (2014). Excess risk of chronic physical conditions associated with depression and anxiety. *BMC Psychiatry*.  
<https://doi.org/10.1186/1471-244X-14-10>
- Bing, W. C., & Kim, S. J. (2021). A phenomenological study of mental health enhancement in taekwondo training: Application of catharsis theory. *International Journal of Environmental Research and Public Health*.  
<https://doi.org/10.3390/ijerph18084082>
- Cha, M.-H. (2021). The inherent meaning of “origin” in Taekwondo history. *Journal of Martial Arts*.  
<https://doi.org/10.51223/kosoma.2021.08.15.4.81-99>
- Choi, C. R., Heo, C. M., Shin, M. S., & Lee, A. R. (2013). A modern history of women taekwondo in Korea since the second world war. In *International Journal of the History of Sport*.  
<https://doi.org/10.1080/09523367.2012.754429>
- Jacob, L., Oh, H., Shin, J. Il, Haro, J. M., Vancampfort, D., Stubbs, B., Jackson, S. E., Smith, L., & Koyanagi, A. (2020). Informal caregiving, chronic physical conditions, and physical multimorbidity in 48 low- And middle-income countries. *Journals of Gerontology - Series A Biological Sciences and Medical Sciences*.  
<https://doi.org/10.1093/GERON A/GLAA017>
- Johnson, J. A. (2018). Taekwondo and peace: How a killing art became a soft diplomacy vehicle for peace. *International Journal of the History of Sport*.  
<https://doi.org/10.1080/09523367.2019.1618838>
- José Enrique, M. G., Arroyo-Del Bosque, R., & Jiménez-Eguizábal, A. (2021). Level of physical condition and practice of physical activity in adolescent school children. *Apunts. Educacion Fisica y Deportes*.  
[https://doi.org/10.5672/APUNT S.2014-0983.ES.\(2021/1\).143.01](https://doi.org/10.5672/APUNT S.2014-0983.ES.(2021/1).143.01)
- Kim, H.-Y., & Choi, K.-K. (2021). A Study on the History of Children,s Taekwondo Demonstrations by Globalizing Taekwondo. *Journal of Coaching Development*.  
<https://doi.org/10.47684/jcd.2021.09.23.3.22>
- Kim, H. B., Johnson, J. A., Lee, E. J., & Ha, P. (2016). An investigation into the history of the taekwondo uniform since the Korean

- Peninsula's liberation from Japan. *International Journal of the History of Sport*. <https://doi.org/10.1080/09523367.2016.1233865>
- Kim, M., Kim, M., & Kim, M. (2021). A case study on service quality perceptions and member retention towards Taekwondo participants in North America. *IJASS(International Journal of Applied Sports Sciences)*. <https://doi.org/10.24985/ijass.2021.33.2.248>
- Kwak, J.-H., & Yang, D.-S. (2021). Analysis of Research Trends in Taekwondo History. *Korean Journal of Sports Science*. <https://doi.org/10.35159/kjss.2021.12.30.6.1>
- Lim, B. O., Kim, J., Kim, S. H., Cho, J. H., Lim, S., & Lim, S. T. (2022). The effects of taekwondo shoes on anterior cruciate ligament injury risk factors during jump whip kicks. *Science and Sports*. <https://doi.org/10.1016/j.scispo.2021.04.002>
- Lu, D., Si, X., & Feng, X. (2017). The hardware implementation and signal control of sanda electronic protection devices. *International Journal of Mechatronics and Applied Mechanics*. <https://doi.org/10.17683/ijomam.issue1.4>
- Maes, M., Van Den Noortgate, W., Fustolo-Gunnink, S. F., Rassart, J., Luyckx, K., & Goossens, L. (2017). Loneliness in Children and Adolescents with Chronic Physical Conditions: A Meta-Analysis. *Journal of Pediatric Psychology*. <https://doi.org/10.1093/jpepsy/jsx046>
- Martínez-Martínez, J., González-Víllora, S., Valcárcel, J. V., & Pastor-Vicedo, J. C. (2020). How does the family influence the physical condition and health of children in a rural environment? *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph17134622>
- Maulana, F., & Rahman, Z. (2020). *HUBUNGAN PANJANG TUNGKAI TERHADAP KECEPATAN DALAM TENDANGAN DOLLYO CHAGI PADA ATLET TAEKWONDO KOTA SABANG. 1(1)*.
- Moenig, U., Choi, H. M., & Kim, M. (2021). The Founder of the International Taekwon-Do Federation (ITF) Choi Hong Hi: An Exploration of Fiction and Fact. *International Journal of the History of Sport*. <https://doi.org/10.1080/09523367.2021.1984232>
- Moenig, U., & Minho, K. (2016). The invention of taekwondo tradition, 1945-1972: When mythology becomes "history." In *Acta Koreana*. <https://doi.org/10.18399/acta.2016.19.2.006>
- Nugraha, S., & Ohara-Hirano, Y. (2014). Mental Health Predictor of the Sixth Batch Indonesian Nurse

- and Certified Care Worker Candidates Migrate to Japan under the Japan–Indonesia Economic Partnership Agreement in Pre-migration Stage. *Journal of Health Science*.
- Rydzewska, E., Dunn, K., & Cooper, S. A. (2021). Umbrella systematic review of systematic reviews and meta-analyses on comorbid physical conditions in people with autism spectrum disorder. In *British Journal of Psychiatry*. <https://doi.org/10.1192/bjp.2020.167>
- Sáez, I., Solabarrieta, J., & Rubio, I. (2020). Physical self-concept, gender, and physical condition of bizkaia university students. *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph17145152>
- Ureña, R., Chiclana, F., Gonzalez-Alvarez, A., Herrera-Viedma, E., & Moral-Munoz, J. A. (2020). m-SFT: A novel mobile health system to assess the elderly physical condition. *Sensors (Switzerland)*. <https://doi.org/10.3390/s20051462>
- Uribe, S. C., Arista-Huaco, M. J., Encalada-Díaz, I. A., & Isla-Alcoser, S. D. (2021). Physical activity, physical condition and quality of life in schoolchildren. *Journal of Human Sport and Exercise*. <https://doi.org/10.14198/jhse.2021.16.Proc3.14>
- Yılmaz, D. S. (2021). CONTENT ANALYSIS OF SOME DOCTORAL THESIS STUDIES CARRIED OUT IN TURKEY ON THE BRANCH OF TAEKWONDO IN THE FIELD OF SPORTS SCIENCES. *European Journal of Physical Education and Sport Science*. <https://doi.org/10.46827/ejpe.v7i4.4010>