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**Original Article Research**

# The Influence of Split and Skipping Exercises on the Speed of Dollyo Chagi Kicks in Tae Kwon Do Martial Arts Athletes

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## Abstract

The purpose of this study is to determine the extent of the effect of split and skipping training on the speed of Dollyo Chagi kicks in Taekwondo martial arts athletes at the Dojang of SMP PGRI 1 Wajak. This research is an experimental study. The method used involves split and skipping training. The participants in this study were 30 Taekwondo athletes from the Dojang of SMP PGRI 1 Wajak, Malang. The research variable is the speed of the Dollyo Chagi kick in Taekwondo athletes at the same Dojang. Data were collected through treatment-based training sessions with specific instructions. The data analysis included a normality test and a homogeneity test. The normality test showed that the data were normally distributed, allowing the treatment to proceed, while the homogeneity test results indicated that the data were homogeneous. Based on the results, it can be concluded that the t-test value for experimental group 1 (3.760) is greater than the t-table value (2.145), indicating that the alternative hypothesis is accepted. This means that split training has a significant effect on the speed of the Dollyo Chagi kick in Taekwondo athletes at SMP PGRI 1 Wajak. Similarly, the t-test value for experimental group 2 (3.720) is greater than the t-table value (2.145), thus accepting the alternative hypothesis. This indicates that skipping training also has a significant effect on the speed of the Dollyo Chagi kick in the same group of athletes. Based on the data analysis, there was a significant improvement in the experimental groups. The treatment, which was conducted over 12 sessions with a frequency of 3 times per week, contributed to the improvement in Dollyo Chagi kick speed.

**Keywords**: *Split Training, Skipping Training, Taekwondo*

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## 1. INTRODUCTION

Taekwondo is a modern martial art that has its roots in traditional Korean martial arts. *Taekwondo has many advantages; it not only teaches physical aspects such as fighting skills, but also places strong emphasis on mental discipline and ethics* (Zheng et al., 2024). *As such, Taekwondo helps to shape a strong mental attitude and ethical character in those who sincerely and properly study it* (Yalfani et al., 2023).*Taekwondo contains deep philosophical elements, so by learning Taekwondo, our mind, spirit, and body are holistically nurtured and developed* (Sousa et al., 2024). *Taekwondo consists of three words:Tae means foot—destroying using kicking techniques, Kwon means hand—striking and defending using hand techniques, and Do means the way or the art of self-discipline. Therefore, in its entirety, Taekwondo can be interpreted as the art or way of self-discipline that uses unarmed hand and foot techniques* (Song & Sheykhlouvand, 2024). The three most important components in Taekwondo training are Poomsae, Kyukpa, and Kyorugi. *Here is a clearer explanation:* **Poomsae**, or forms, is a series of fundamental offensive and defensive techniques performed against an imaginary opponent, following a specific diagram (Shin et al., 2024). Each diagram in the poomsae sequence is based on Eastern philosophy, reflecting the spirit and worldview of the Korean people (Rajabi-Abhari et al., 2024). **Kyukpa**, or breaking techniques, involves practicing techniques using inanimate objects as targets to measure the power and precision of one's techniques (Putra et al., 2023). Common target objects include wooden boards, bricks, roof tiles, and others (Song & Sheykhlouvand, 2024). These techniques are executed using kicks, punches, strikes, and even fingertip thrusts (Pitajaya et al., 2023). **Kyorugi**, or sparring, is a form of training that applies the basic techniques or poomsae, where two practitioners engage in combat, practicing both offensive and defensive techniques against each other (Ouergui, Jebabli, et al., 2023). Learning Taekwondo does not only involve mastering its self-defense techniques, but must also encompass the physical, mental, and spiritual aspects (Ouergui, Delleli, et al., 2023). Therefore, a person who trains in or studies Taekwondo should demonstrate good physical condition, strong mental resilience, and high enthusiasm (Ou et al., 2024). However, these qualities must also be reflected in good daily behavior and actions, guided by a noble spirit (Ng-Knight et al., 2022). Only then can a person be considered truly successful in practicing Taekwondo (MOENIG & and KIM, 2021).

Based on the writer's observations of the Taekwondo athletes at the SMP PGRI 1 Wajak dojang, during trial sessions at the training place (dojang) and in the competitions they participated in,the *dollyo chagi* kick was the most frequently used technique (Ma et al., 2021). This is because the *dollyo chagi* is considered a fast, simple, and effective kick for attacks (R. Liu & He, 2022). How ever, it was observed that the *dollyo chagi* technique used by the athletes is still weak, stiff, and lacks efficiency (H. Liu & Jiang, 2024). As a result, the athletes' ability to perform the *dollyo chagi* kick is not yet optimal.

### 1.1 Training

In simple terms, training can be defined as all efforts and exertions aimed at improving physical condition as a whole through a systematic and repetitive process, with gradually increasing training load, duration, or intensity over time (Linhares et al., 2022). A person engages in training as a means to achieve a specific goal (Li et al., 2024). Training is not a new conceptit has been carried out systematically since ancient times as a way to reach certain objectives (Kim & Nam, 2021).

Training is an individual's effort to improve the condition and function of the body in

order to optimize sports performance and achievement (Khazaei et al., 2023). The goal of training is to achieve the highest possible level of performance, but the process of training is not easy or simple (Jeong et al., 2021). The training program provided by the coach plays a crucial role in supporting the quality of training appropriate to each specific sport (Herdianus, 2024). It is not only physical training that must be developed to reach optimal performance-technique, tactics, and mental preparation are also essential aspects that need to be trained (Herdianus, 2024).

Training, in principle, is a process of change toward improvement—aimed at enhancing physical quality, the functional ability of body systems, and the psychological quality of the trainee (G.x et al., 2023). Training can also be defined as a systematic practice process carried out repeatedly, with the training load gradually increasing over time (Fajar et al., 2023). Based on the explanation above, it can be concluded that training is a conscious, systematic, gradual, and repetitive sports activity conducted over a relatively long period of time, with the ultimate goal of achieving optimal performance improvement (Castor-Praga et al., 2021). To ensure that training results in optimal performance, the training program or methods used should take into account the individual's basic capabilities, while also adhering to and applying the principles of training.

Systematic means planned, following a schedule and a specific system or pattern—using methods that progress from easy to difficult, and conducting regular training from simple to complex exercises. Repetitive means that movements which are initially difficult become easier and more automatic through repeated practice. Increasing load means that periodically, when the time is right, the training load is increased in order to stimulate further improvement and achieve optimal performance.

### 1.2 Physical Training

If these factors are not achieved or are insufficient after a certain period of physical training, it means that the planning and systematic training are imperfect. Since success in sports often requires perfect skills under high physical stress, it becomes increasingly clear that physical condition plays a very important role in improving an athlete's performance. Therefore, before entering the competition arena, an athlete must already be in good physical condition and fitness level to face the intensity of work and all kinds of stress that will be encountered during the competition. Without careful and serious physical preparation, athletes should be prohibited from participating in any competition. The most dangerous period in training is usually the first three or four weeks of the training season, because at that time athletes generally do not yet have sufficient strength, flexibility, endurance, and skills, which means their physical condition is still far below what is required for intense training or competition. Another factor is that they are not yet agile enough in performing movements, so sudden or forceful motions often cause muscle and joint injuries.

In conducting physical conditioning and achieving optimal fitness development, emphasis must be placed on the overall development of the body, with training intensity regularly increased.During the preseason, which is the training period well before competition, various components of physical fitness must be trained so that by the time the athlete enters the early and mid-season, they will have already reached a good level of physical condition. The conditioning process in sports is something that must be carried out carefully, patiently, and with close attention to the athlete's condition. Through repeated training sessions, with gradually increasing intensity and complexity, the athlete will slowly transform into someone who is more agile, faster, stronger, more skilled, and ultimately more effective.

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The conditioning process must be able to stimulate positive responses within the body, such as improvements in our neurophysiological organization and progress in making adaptive alterations within body tissues. Sports experts believe that athletes who undergo an intensive pre-season physical conditioning program for 6–10 weeks will have greater strength, endurance, and stamina during the following training seasons compared to athletes who begin conditioning only one or two weeks before the start of the training season. Once athletes have reached a good level of physical condition to face the upcoming seasons, the conditioning training should continue throughout the competitive season, although not as intensively as before, in order to maintain that level of physical fitness throughout the training period.

### 1.3 Split and Skipping Training Methods

**Dynamic Stretching**

Also known as ballistic stretching, dynamic stretching is typically performed by moving the body or body parts rhythmically, using swinging or bouncing motions that stretch the muscles, with the goal of progressively increasing the range of motion in the joints. Dynamic stretching exercises are done by rhythmically moving body parts with circular or bouncing motions so that the muscles feel stretched.

**Static Stretching**

A person's level of flexibility is a measurable component based on their ability to perform body movements, either as a whole or in specific anatomical parts, through various movement patterns. Static flexibility can be trained through stretching exercises that are commonly done before and after physical activities. However, static stretching is not the same as warming up. Static stretching is often performed in the morning because the human body's anatomical system is highly exhausting to the nervous system before training or competition. The recommended duration for static stretching is 10–15 minutes. Static stretching can be performed by positioning the body in a way that stretches a specific muscle group.

**Partner-Assisted Stretching**

The performer contracts a muscle group against the resistance provided by a partner for six seconds. Flexibility PNF (Proprioceptive Neuromuscular Facilitation) is a strengthening technique used in exercises based on anatomy and neurophysiology. PNF exercises are employed to improve strength, flexibility, and range of motion (ROM). Essentially, PNF exercises are stretch reflexes stimulated by the Golgi tendon organ and muscle fiber groups. This stimulation sends impulses to the brain, leading to contraction and relaxation of the muscles. When a part of the body is injured, it affects the Golgi tendon organ and muscle fibers, resulting in muscle weakness. PNF exercises help to re-educate the injured body parts by reintroducing them to sensory stimulation. The technique involves performing a stretch with the help of another person. The athlete performs static stretching, and then the partner gradually applies resistance while the athlete holds the stretch, causing an isometric contraction. After a few seconds, the athlete relaxes, and the partner continues to push until the stretch reaches its optimal point.

## 2. METHOD

Research methods are defined as scientific ways to obtain data with specific goals and purposes, while educational research methods are described as scientific ways to obtain valid data with the aim of discovering, developing, and proving certain knowledge. This knowledge can, in

turn, be used to understand, solve, and anticipate problems in the field of sports. In this study, the research method used is the experimental method, which is employed to investigate the effects of a specific treatment on others under controlled conditions. The experimental method is a subset of quantitative research methods.

### 2.1 Participants

A person's level of flexibility is a measurable component based on their ability to perform body movements, either as a whole or in specific anatomical parts, through various movement patterns. Static flexibility can be trained through stretching exercises that are commonly done before and after physical activities. However, static stretching is not the same as warming up. Static stretching is often performed in the morning because the human body's anatomical system is highly exhausting to the nervous system before training or competition. The recommended duration for static stretching is 10–15 minutes. Static stretching can be performed by positioning the body in a way that stretches a specific muscle group. The participant contracts a muscle group against resistance provided by a partner for six seconds.PNF Flexibility (Proprioceptive Neuromuscular Facilitation) PNF is a strengthening technique used in training based on anatomy and neurophysiology. PNF exercises are used to improve strength, flexibility, and range of motion (ROM). Basically, PNF training is a stretch reflex stimulated by the Golgi tendon organs and muscle fiber groups. This stimulation sends impulses to the brain, causing muscle contraction and relaxation. When a part of the body is injured, it affects the Golgi tendon organs and muscle fiber groups, resulting in muscle weakness. PNF training helps to re-educate the motor units of the injured body part to respond to stimulation. The procedure involves assisted stretching, where the athlete performs static stretching with the help of a partner. The partner then gently pushes while the athlete resists until an isometric contraction occurs. After a few seconds, the athlete relaxes, and the partner continues to push until the optimal stretch point is reached.

### 2.2 Research Design

The research method used is the experimental method, which is "a research method used to investigate the effect of a certain treatment on another variable under controlled conditions. The experimental method is part of quantitative methods." This study employs a quantitative design called the Two Group Pretest-Posttest design, which is an experimental design conducted on two different groups receiving different training treatments. This model is more robust compared to a simpler design because it includes an initial test (pretest) followed by a post-treatment measurement (posttest) to determine the effect of the treatment, allowing the precise assessment of the experimental effect. The first group received split training, while the second group received skipping training. The objective of this study is to identify the comparative effectiveness of split training versus skipping training on the speed of the dollyo chagi kick among Taekwondo athletes at the SMP PGRI 1 Wajak Malang dojang. The participants in this study are Taekwondo athletes from the SMP PGRI 1 Wajak dojang, who are registered members of the Taekwondo club there. The sample consists of 30 students from the Taekwondo dojang. All samples underwent a pretest to determine group allocation. The pretest scores were ranked using ordinal pairing and then matched with an A-B-B-A pattern into two groups with an equal number of members. The sample was divided into two groups of 30 each: Group 1: received the split training treatment. Group 2: received the skipping training treatment. Group allocation was based on the dollyo chagi kick performance in the pretest. After ranking the pretest scores, participants with similar skill levels were paired and assigned to Group 1 and Group 2, ensuring the groups

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were equivalent before treatment. Therefore, any differences observed after treatment can be attributed to the treatments themselves. The group division in this study was done using ordinal pairing.

### 2.3 Instruments

This research employs one research instrument, namely: measuring the ability of dollyo chagi kicks before and after carrying out Split and Skipping training. The instrument used in this research is a tiered instrument.

### 2.4 Procedures

The activities conducted are as follows: first, giving commands to start/stop, the second officer records the number of kicks in one minute, and lastly, supervises to ensure that only kicks performed with the correct technique are counted.

**Test Implementation:**

a. The athlete stands facing the target (target area), ready to perform the dollyo chagi kick.

b. After the command is given, the athlete performs the dollyo chagi kick technique consecutively.

c. Each kick must return to the starting position, and each athlete is given one opportunity to perform the kicks quickly. The assessment is based on the total number of kicks performed in one minute. The collected data needs to be analyzed using both descriptive and inferential statistics for hypothesis testing purposes. In previous research, the research instrument was tested. A trial run was conducted to obtain an instrument that is both valid and reliable. The testing was carried out on Taekwondo athletes from SMP PGRI 1 Wajak Malang, involving all 30 selected students.

### 2.5 Data Analysis

In this study, data analysis is used to answer the proposed hypothesis. Before data analysis is conducted, prerequisite tests must be performed, namely normality test and homogeneity test.

## 3. RESULTS

**Tabel 1**

Data from the t-test results between the pretest and posttest of dollyo chagi kick speed for Experiment Group 1**.**

| Uraian | Rata-rata | $^{T}$ test | d.b | $^{T}$ tabel | Taraf signifikan |
|---|---|---|---|---|---|
| pretest | 6,8 | 3,6 | 1 | 2,1 | 5% |
| Posttest | 7,94 | 70 | 4 | 45 | |

As shown in the table above, it can be seen that the t-test calculation results for the dollyo chagi kick speed test in Experiment Group 1 yielded a t-value of 3.670, while the t-table value at a 5% significance level and degrees of freedom (df) of 14 is 2.145. Based on these results, it can be concluded that the t-test value for Experiment Group 1 (3.670) is greater than the t-table value (2.145), so the alternative hypothesis in this study is accepted. This means that there is a significant effect of the split training on the dollyo chagi kick speed among Taekwondo athletes

at SMP PGRI 1 Wajak Malang.

**Tabel 2**

Data from the t-test results between the pretest and posttest of dollyo chagi kick speed for Experiment Group 2.

| Uraian | Rata-rata | $^{t}$ test | d.b | $^{t}$ tabel | Taraf signifikasi |
|---|---|---|---|---|---|
| pretest | 6,89 | 3,720 | 14 | 2,145 | |
| Posstest | 7,98 | | | | |

According to the table above, it can be seen that the result of the t-test calculation for the dollyo chagi kick speed test of experimental group 2 has a t value of 3.720 while the t table value at a significance level of 5% and degrees of freedom (d.f.) of 14 is 2.145. Based on these results, it can be concluded that the t-test value for Experiment Group 2 (3.720) is greater than the t-table value (2.145), so the alternative hypothesis in this study is accepted. This means that there is a significant effect of skipping training on the dollyo chagi kick speed among Taekwondo athletes at SMP PGRI 1 Wajak Malang.

Tabel 3

Analysis of the mean difference in the posttest between the two experimental groups.

| Data | Rata-rata | T test | d.b | ttabel |
|---|---|---|---|---|
| | | | | |
| Posstest X1 | 7,94 | 0,120 | 28 | 1,70 |
| Posttest X2 | 7,98 | | | |

Based on the table above, it is known that the t-test value = 0.120 with degrees of freedom (df) = 28. A one-score test was then conducted. The table value at $t_{0.95}$ = 1.70. From the data analysis above, the t-test value = 0.120 < $t_{0.95}$ = 1.70. This means that the alternative hypothesis (Ha) is rejected and the null hypothesis (Ho) is accepted.

## 4. DISCUSSIONS

Based on the data analysis of the research results, a significant improvement was observed in the group being studied. The treatment given over 12 sessions, with a frequency of 3 times a week, had an impact on improving the dollyo chagi kick speed.

### 4.1 The Effect of the Split Training Group

Based on the results, it can be concluded that the t-test value for experiment group 1 (3.760) > t-table value (2.145), so the alternative hypothesis in this study is accepted. This means that there is a significant effect of split training on the speed of the dollyo chagi kick in the taekwondo athletes of SMP PGRI 1 Wajak Malang. Split is a movement in sports or physical fitness where one sits and stretches both legs to the sides, each leg facing outward, and continues until the thighs touch the floor or mat (according to the website brainly.co.id). Therefore, this training has a factor that influences the dollyo chagi kick.

### 4.2 The Effect of the Skipping Training Group

Based on the results, it can be concluded that the t-test value for experimental group 2 (3.720) is greater than the t-table value (2.145), thus the alternative hypothesis in this study is accepted. This means that there is a significant effect of skipping training on the speed of the dollyo chagi kick in taekwondo athletes of SMP PGRI 1 Wajak Malang."Skipping is an activity that uses a rope, with both ends of the rope held in each hand, swung over the head and jumped over by the feet." Therefore, this training method has an effect on the dollyo chagi kick.

## 5. CONCLUSIONS

Based on the results of the data analysis, description, testing of research outcomes, and discussion, it can be concluded that the implementation of split training and skipping training has an impact on the speed of the dollyo chagi kick in taekwondo athletes at SMP PGRI 1 Wajak Malang. This training method has a better value for improving the speed of the dollyo chagi kick. Based on the conclusions of the research above, there are several suggestions that can be made, namely:

Based on the conclusions of the research above, there are several suggestions that can be made, namely:

1. For students, it is recommended to intensify training to improve kick speed, one of which can be achieved by regularly practicing splits and skipping with proper rhythm and tempo.
2. For coaches, it is expected to provide effective training methods so that the students' kick speed continues to improve.
3. Further research should be conducted by adding other variables.

The researcher is expected to develop the study by using other forms of speed training:

1. For students, it is recommended to further enhance their training to improve kick speed, one of which can be achieved by regularly practicing splits and skipping with proper rhythm and tempo.
2. For coaches, it is hoped that they can provide effective training methods to increase the students' kick speed.
3. Further research should be conducted by adding other variables.

The researcher is also expected to expand the study by incorporating other types of speed training.

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## REFERENCES

Castor-Praga, C., Lopez-Walle, J. M., & Sanchez-Lopez, J. (2021). Multilevel Evaluation of Rapid

Weight Loss in Wrestling and Taekwondo. *Frontiers in Sociology*, *6*. https://doi.org/10.3389/fsoc.2021.637671

Fajar, M., Rusdiawan, A., & Rasyid, M. (2023). Improving leg power and Dolyo Chagi kick speed

in Taekwondo using plyometric, SAQ, and circuit training methods. *Jurnal Keolahragaan*, *11*(1), 87–94. https://doi.org/10.21831/jk.v11i1.57955

G.x, E., T.f, S., & N.m, M. (2023). DIAGNOSTIC SIGNIFICANCE OF PSYCHODIAGNOSTIC

EXAMINATIONS OF TAEKWONDO PLAYERS. *Frontline Medical Sciences and Pharmaceutical Journal*, *3*(06), Article 06. https://doi.org/10.37547/medical-fmspj-03-06-04

Herdianus, Y. (2024). PENERAPAN MODEL LATIHAN YOJU BERBASIS PLYOMETRIC

TERHADAP DAYA LEDAK TENDANGAN ATLET JUJITSU KOTA SURABAYA KATEGORI KOMITE. *Indonesia Strength Conditioning and Coaching Journal*, *2*(1), 40–51.

Jeong, H. S., Ha, S., Jeong, D. H., O'Sullivan, D. M., & Lee, S. Y. (2021). Injury and Illness in

World Taekwondo Junior Athletes: An Epidemiological Study. *International Journal of Environmental Research and Public Health*, *18*(4), Article 4. https://doi.org/10.3390/ijerph18042134

Khazaei, L., Parnow, A., & Amani-shalamzari, S. (2023). Comparing the effects of traditional

resistance training and functional training on the bio-motor capacities of female elite taekwondo athletes. *BMC Sports Science, Medicine and Rehabilitation*, *15*(1), 139. https://doi.org/10.1186/s13102-023-00754-9

Kim, J.-W., & Nam, S.-S. (2021). Physical Characteristics and Physical Fitness Profiles of Korean

Taekwondo Athletes: A Systematic Review. *International Journal of Environmental Research and Public Health*, *18*(18), Article 18. https://doi.org/10.3390/ijerph18189624

Li, X., Bae, J.-H., Lim, B., Seo, J., Sung, Y., Jiang, S., Jamrasi, P., Ahn, S., Shin, C., Pan, M., &

Song, W. (2024). Impact of Taekwondo training on cognitive and physical function in elderly individuals: A comprehensive review of randomized controlled trials. *Complementary Therapies in Clinical Practice*, *57*, 101878. https://doi.org/10.1016/j.ctcp.2024.101878

Linhares, D. G., Santos, A. O. B. dos, Santos, L. L. dos, Marcos-Pardo, P. J., Cordeiro, L. de S.,

Castro, J. B. P. de, & Vale, R. G. de S. (2022). Effects of taekwondo on health in older people: A systematic review. *Retos*, *46*, 36–42. https://doi.org/10.47197/retos.v46.93336

Liu, H., & Jiang, F. (2024). Taekwondo competition marketization development strategy based on

SWOT-AHP model. *Salud, Ciencia y Tecnología - Serie de Conferencias*, *3*(0), 917.

Liu, R., & He, L. (2022). The relationship between physical fitness and competitive performance of

Taekwondo athletes. *PLOS ONE*, *17*(6), e0267711. https://doi.org/10.1371/journal.pone.0267711

Ma, Y., Ouyang, J., Raza, T., Li, P., Jian, A., Li, Z., Liu, H., Chen, M., Zhang, X., Qu, L., Tian, M.,

& Tao, G. (2021). Flexible all-textile dual tactile-tension sensors for monitoring athletic motion during taekwondo. *Nano Energy*, *85*, 105941. https://doi.org/10.1016/j.nanoen.2021.105941

MOENIG, U., & and KIM, Y. I. (2021). The Early Globalization Process of Taekwondo, from the

1950s to 1971. *The International Journal of the History of Sport*, *37*(17), 1807–1826. https://doi.org/10.1080/09523367.2020.1845151

Ng-Knight, T., Gilligan-Lee, K. A., Massonnié, J., Gaspard, H., Gooch, D., Querstret, D., &

Johnstone, N. (2022). Does Taekwondo improve children's self-regulation? If so, how? A randomized field experiment. *Developmental Psychology*, *58*(3), 522–534. https://doi.org/10.1037/dev0001307

Ou, Z., Yang, L., Wu, J., Xu, M., Weng, X., & Xu, G. (2024). Metabolic characteristics of

ischaemic preconditioning induced performance improvement in Taekwondo athletes using LC–MS/MS-based plasma metabolomics. *Scientific Reports*, *14*(1), 24609. https://doi.org/10.1038/s41598-024-76045-1

Ouergui, I., Delleli, S., Bridge, C. A., Messaoudi, H., Chtourou, H., Ballmann, C. G., Ardigò, L. P.,

& Franchini, E. (2023). Acute effects of caffeine supplementation on taekwondo performance: The influence of competition level and sex. *Scientific Reports*, *13*(1), 13795. https://doi.org/10.1038/s41598-023-40365-5

Ouergui, I., Jebabli, E., Delleli, S., Messaoudi, H., Bridge, C. A., Chtourou, H., Franchini, E.,

Ballmann, C. G., & Ardigò, L. P. (2023). Listening to Preferred and Loud Music Enhances Taekwondo Physical Performances in Adolescent Athletes. *Perceptual and Motor Skills*, *130*(4), 1644–1662. https://doi.org/10.1177/00315125231178067

Pitajaya, V. W., Suwirman, S., Yaslindo, Y., & Sasmitha, W. (2023). Tingkat Kondisi Fisik Atlet

putra Taekwondo Dojang UniversitasNegeri Padang. *Jurnal JPDO*, *6*(2), Article 2.

Putra, A. J., Sukendro, S., & Putra, A. A. (2023). PERBEDAAN EFEKTIFITAS LATIHAN

SKIPPING DAN LADDER DRILL TERHADAP KECEPATAN TENDANGAN DOLLYO CAGHI ATLET TAEKWONDO. *Journal of Sport Science and Fitness*, *9*(1), Article 1. https://doi.org/10.15294/jssf.v9i1.71457

Rajabi-Abhari, A., Yoo, H., Kim, J.-S., Yoon, H. Y., Park, J. Y., Yan, N., Tabassian, R., & Oh, I.-

K. (2024). Reversibly Compressible Silanated Cellulose Nanofibril Aerogel for Triboelectric Taekwondo Scoring Sensors. *Small*, *20*(50), 2405664. https://doi.org/10.1002/smll.202405664

Shin, M.-C., Lee, D.-H., Chung, A., & Kang, Y.-W. (2024). When Taekwondo Meets Artificial

Intelligence: The Development of Taekwondo. *Applied Sciences*, *14*(7), Article 7. https://doi.org/10.3390/app14073093

Song, Y., & Sheykhlouvand, M. (2024). A Comparative Analysis of High-Intensity Technique-

Specific Intervals and Short Sprint Interval Training in Taekwondo Athletes: Effects on Cardiorespiratory Fitness and Anaerobic Power. *Journal of Sports Science & Medicine*, *23*(3), 672–683. https://doi.org/10.52082/jssm.2024.672

Sousa, J., Gamonales Puerto, J. M., Hernández Beltrán, V., Louro, H., & Ibáñez Godoy, S. J.

(2024). Effective techniques analysis in taekwondo: A systematic review. *Retos: Nuevas Tendencias En Educación Física, Deporte y Recreación*, *53*, 78–90.

Yalfani, A., Ahmadi, M., Asgarpoor, A., & Haji Ahmadi, A. (2023). Effect of foot orthoses on

dynamic balance in taekwondo athletes with flexible flatfoot: A randomized controlled trial. *The Foot*, *56*, 102042. https://doi.org/10.1016/j.foot.2023.102042

Zheng, A.-C., He, C.-S., Lu, C.-C., Hung, B.-L., Chou, K.-M., & Fang, S.-H. (2024). *The Cognitive*

*Function and Taekwondo-Specific Kick Performance of Taekwondo Athletes at Different Hydration Statuses*. https://doi.org/10.1123/ijspp.2023-0332