

The Effect of Weight Training Exercise on the Results of Ap Chagi Kicks in Extracurricular Activities at MAN Insan Cendekia OKI

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Abstrak

Penelitian ini bertujuan untuk menganalisis pengaruh latihan beban terhadap kemampuan tendangan Ap Chagi pada siswa yang mengikuti kegiatan ekstrakurikuler di MAN Insan Cendekia OKI. Metode penelitian yang digunakan adalah metode eksperimen dengan desain one-group pretest–posttest. Sampel penelitian terdiri dari 15 siswa yang tergabung dalam kegiatan ekstrakurikuler Taekwondo di MAN Insan Cendekia OKI. Instrumen yang digunakan dalam penelitian ini adalah tes kemampuan tendangan Ap Chagi yang dilaksanakan sebelum dan sesudah pemberian perlakuan. Data yang diperoleh kemudian dianalisis menggunakan uji t sampel berpasangan (paired sample t-test) untuk mengetahui perbedaan yang signifikan antara hasil pretest dan posttest. Hasil penelitian menunjukkan adanya peningkatan yang signifikan pada kemampuan tendangan Ap Chagi setelah diberikan latihan beban. Nilai rata-rata posttest meningkat menjadi 16,8, lebih tinggi dibandingkan dengan nilai rata-rata pretest sebesar 10,93. Hal ini menunjukkan bahwa latihan beban efektif dalam meningkatkan akurasi, kecepatan, dan kekuatan tendangan Ap Chagi. Berdasarkan hasil tersebut, dapat disimpulkan bahwa latihan beban memberikan pengaruh positif dan signifikan terhadap peningkatan kemampuan tendangan Ap Chagi pada siswa yang mengikuti kegiatan ekstrakurikuler di MAN Insan Cendekia OKI.

Kata kunci: Latihan Beban, Performa Tendangan Ap Chagi, Taekwondo

Abstract

This study was conducted to examine the effect of weight training on the Ap Chagi kicking performance of students involved in extracurricular activities at MAN Insan Cendekia OKI. The research employed an experimental approach using a one-group pretest–posttest design. The participants consisted of 15 students who were members of the Taekwondo extracurricular program at MAN Insan Cendekia OKI. The instrument utilized in this study was an Ap Chagi kicking ability test administered prior to and following the implementation of the training program. The collected data were analyzed using a paired sample t-test to identify significant differences between the pretest and posttest scores. The findings revealed a significant improvement in the students' Ap Chagi kicking ability after the implementation of weight training. The mean posttest score increased to 16.8, which was considerably higher than the mean pretest score of 10.93. These results indicate that weight training effectively enhances the accuracy, speed, and power of the Ap Chagi kick. In conclusion, weight training provides a positive and statistically significant contribution to the improvement of Ap Chagi kicking ability among students participating in the extracurricular activities at MAN Insan Cendekia OKI.

Keywords: Weight Training, Ap Chagi Kick Performance, Taekwondo

History:

Received : 2 March 2026
Revised : 2 March 2026
Accepted : 4 March 2026
Published : 8 March 2026

Publisher: Horizon Edukasi Prima Indonesia

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1. INTRODUCTION

Sport is an activity that involves both physical and psychological aspects and plays an important role in maintaining and improving the quality of human health. In addition to contributing to individual well-being, sport also represents an important sector that deserves continuous development, as it has the potential to enhance national pride and achievements at both regional and international levels (Kuntjiro, 2020). In line with this, Law Number 3 of 2005 concerning the National Sports System, Article 1 paragraph 13, states that achievement sport refers to sporting activities aimed at fostering and developing athletes in a planned, systematic, and sustainable manner through competitions, supported by the application of sports science and technology to achieve optimal performance.

In general, sport can be defined as a physical activity carried out by individuals or groups for purposes such as recreation, health improvement, training, or competition. These activities involve organized and structured body movements that are usually governed by specific rules or norms. Sports vary widely in form and intensity, ranging from light physical activities such as walking to more demanding sports such as football, basketball, volleyball, and table tennis (Agnes Sopiayah Maliza et al., 2023; Priambudhi, 2023). Through consistent participation in sports, individuals can enhance their physical fitness while also developing discipline, cooperation, and various motor skills.

One of the martial arts that has gained significant popularity is taekwondo. This sport emphasizes not only physical capability but also the development of discipline, ethics, and mental strength among its practitioners. Through continuous training and learning, athletes gradually develop mental, spiritual, ethical, and physical aspects, since taekwondo incorporates philosophical values within its practice (Putri et al., 2022). In addition, taekwondo training includes several fundamental components such as poomsae (forms), kyukpa (breaking techniques), and various offensive and defensive movements that serve as the foundation of the sport (Wathoni et al., 2021, as cited in Putri et al., 2022). As stated by V. Yoyok Suryadi (as cited in Ambia et al., 2024), taekwondo is one of the most widely practiced martial arts and continues to develop rapidly in Indonesia, particularly among children and adolescents. For members of taekwondo associations, achieving the highest level of performance is a primary objective, which is influenced by multiple supporting factors.

The fundamental techniques in taekwondo consist of a combination of attacking and defensive movements that involve different parts of the body when confronting an opponent. Several key elements form the basic foundation of taekwondo techniques, including keup so, which refers to the target areas of the body; body parts used for both offense and defense; seogi, or the stance positions that support balance and stability; makki, which refers to blocking or defensive techniques; and kyongkok kisul, which includes offensive techniques such as jireugi (punches), chigi (strikes), chierugi (thrusts), and chagi (kicks) (Muharram &

Puspodari, 2020; Putri et al., 2022). Among these techniques, kicking movements play a dominant role in taekwondo performance.

Maintaining good physical condition is an important goal for every athlete. One form of training that supports this objective is weight training, which is a systematic exercise program that uses external loads to improve muscle strength, physical fitness, and overall health. Weight training also helps strengthen muscles, prevent muscular imbalances, and enhance sports performance (Harsono, 2016, as cited in Pgri & Jasmani, 2023). To obtain optimal benefits, weight training should be conducted regularly with an appropriate frequency and intensity. Generally, training is recommended three to five times per week, depending on the specific goals of the exercise program. Properly structured weight training can improve muscular strength, reduce the risk of injury, and maximize athletic performance (Nasrulloh et al., 2018, as cited in Prasetyo et al., 2022).

Kicking techniques represent one of the most essential skills in taekwondo and must be mastered by athletes because they serve as the primary method of attacking and scoring points during competitions. According to Roslan and Abdullah (2020, as cited in Wardhani & Yane, 2023), foot techniques are frequently used in taekwondo matches because they provide higher scoring opportunities. Therefore, coaches must focus on improving athletes' kicking skills in order to develop highly competent taekwondo athletes (Burdukiewicz et al., 2018, as cited in Wardhani & Yane, 2023). One approach to developing these skills is through extracurricular sports activities in schools, which serve as platforms for students to explore their interests and talents outside regular classroom hours. These activities provide structured training opportunities and necessary support to encourage students to engage actively in physical activities (Hartati & Kusnanik, 2017, as cited in Agnes Sopiya Maliza et al., 2023).

Numerous studies have demonstrated that weight training plays a significant role in improving kicking performance across various martial arts and sports. In karate, research examining the effect of weight training methods on the explosive power of the mae geri kick found that circuit training was more effective than traditional set training in enhancing kicking power, while also revealing an interaction between training methods and technical execution. Similar findings were reported in studies analyzing the relationship between leg muscle power, speed, and flexibility with mawashi geri performance, indicating that muscle strength components significantly influence kick quality. Additionally, the use of ankle weights among karate athletes has been shown to increase kicking speed.

Comparable findings have also been observed in taekwondo. Various physical and resistance training programs have been proven to improve the performance of kicks such as dollyo chagi. Training using Kettler weights and ankle weights significantly enhances kicking ability, while general physical training programs contribute to improvements in kick speed. Biomechanical studies also suggest that both external loads and body weight influence the

quality of kicking performance. Furthermore, strength training programs based on Olympic weightlifting have been shown to enhance power and roundhouse kick performance among Muay Thai athletes, highlighting the importance of resistance training in striking-based sports.

Similar patterns have been observed in other martial arts. In Pencak Silat, experimental research using a pretest–posttest design revealed that weight training targeting the leg muscles significantly increased the speed of the sickle kick. Training methods utilizing resistance bands, ankle weights, and squat variations with additional loads were also found to be effective in improving front kick speed. In addition, plyometric exercises such as standing jumps and sprints have been proven to enhance the power and speed of the “T” kick. Other quasi-experimental studies further confirmed that weight training contributes to improvements in kicking ability by enhancing power, balance, and coordination.

In Wushu, weight training has been shown to significantly improve the agility of the cechuitui side kick. This finding is consistent with research conducted on soccer players in Jember, which demonstrated that weight training enhances leg muscle strength and kicking ability. Although these studies involve different sports, the similarity in the biomechanical mechanisms of kicking movements suggests that the benefits of weight training can be generalized across sports that rely on kicking techniques. Overall, the findings from these studies consistently indicate that weight training whether implemented through circuit systems, ankle weights, resistance bands, plyometrics, or weightlifting has a significant impact on improving kicking performance. These results strengthen the theoretical foundation that increasing leg muscle strength and power through weight training directly contributes to the improvement of kicking technique, speed, and overall performance in martial arts and other sports.

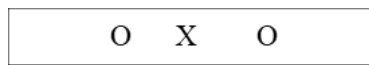
2. METHOD

In any research, a method is absolutely necessary because it provides a way to complete the research. A research method is defined as a scientific way to obtain data for a specific purpose and purpose (Sugiyono, 2019). The use of methods and the selection of an appropriate method will aid the research process. Based on the problem formulation and research objectives, the method used in this study is the experimental method. Experimental research methods are used to determine the effect of certain treatments on others under controlled conditions. Experimental methods are a way to establish a causal relationship between two factors intentionally created by the researcher by eliminating, reducing, or eliminating other interfering factors (Sugiyono, 2019) Therefore, this experimental method is used to reveal the presence or absence of influence from the variables selected for research.

Data collection techniques are the most crucial step in research because the primary goal is to obtain data. Without an understanding of data collection techniques, researchers will not be able to obtain data that meets established data standards (Sugiyono, 2021). According to Sugiyono (2022) data collection techniques are the most crucial step in research because the primary goal is to find results. The data collection techniques used in this study included pre-tests and post-tests, which are useful for determining the results of the treatment given to the sample.

Data collection techniques were implemented through tests and measurements, which allow us to obtain objective data.

This research is an experimental study with a pre-experimental design. The design used is a pretest-posttest group design. Briefly, this design can be described as follows.



Keterangan:

X = Treatment with Weight Training (independent variable)

O = *Pretest/Posttest (Dependent variable)*

The research subjects consisted of 15 male students participating in the Taekwondo extracurricular program, selected based on gender to facilitate the implementation of the training.

3. RESULT AND DISCUSSION

Result

3.1 Normality Test

The Kolmogorov-Smirnov test for data normality in this study used the data normality test method. The results of the data normality test for each analysis group were performed using SPSS version 25.0 for Windows with a significance level of 5% or 0.05. The data tested for normality were obtained from the pretest and posttest results. The results are presented in Table 1.

Table 1. *Normality Test*

Data	P	Significant	Description
<i>Pretest</i>	0,933	0,05	Normal
<i>Posttest</i>	0,995		Normal

Based on the statistical analysis of the normality test that has been carried out using the Kolmogorov Smirnov Z test, in all pretest and posttest data of table tennis service, the results of the data normality test obtained a significance value of $p > 0.05$, which means the data is normally distributed.

3.2 Homogeneity Test

A homogeneity test is conducted to determine whether several samples are homogeneous or not. The homogeneity test is intended to examine the equality of variances between the pretest and posttest. The homogeneity test in this study used the Levene's Test. The data tested for homogeneity were obtained from the results of the initial and final service tests in table tennis. The results of the homogeneity test are presented in Table 2.

Table 2. Homogeneity Test

Group	Levene Statistic	df1	df2	Sig.	Description
Pretest	1,084	1	14	0,316	Homogen
Posttest	2,928	1	14	0,105	Homogen

Based on the statistical analysis of the homogeneity test conducted using the Levene Test, the pretest obtained a significance value of $0.316 \geq 0.05$, indicating that the data group had homogeneous variance. Similarly, the posttest calculation results obtained a significance value of $0.105 \geq 0.05$, indicating that the data group had homogeneous variance. Thus, the population has similar variance or homogeneity.

3.3 Hypothesis Test Results

The t-test was conducted to examine the first hypothesis, which states, "There is an effect of Weight Training on the Ap Chagi kicking performance of extracurricular students at MAN Insan Cendekia OKI," based on the results of the pretest and posttest. If the analysis shows a significant difference, then Weight Training has an effect on Ap Chagi kicking performance. The study's conclusion is considered significant when viewed from the calculation of the paired two-sample t-test using Excel data analysis as follows.

Table 3. Results of the Multiball Training Group's Service T-Test

	Pretest	Posttest
Mean	10,93333333	16,8
Variance	28,92380952	18,45714
Observations	15	15
Pearson Correlation	0,932999082	
Hypothesized Mean Difference	0	

Df	14	
t Stat	-11	
P(T<=t) one-tail	0,001317	
t Critical one-tail	1,761310	
P(T<=t) two-tail	0,002634	≤ 0,05
t Critical two-tail	2,144787	

From the table above, it can be seen that the conclusion for $P(T \leq t)$ two-tail is 0.002634. This means the value is significant because $0.002634 \leq 0.05$, indicating that there is a significant difference. Thus, the alternative hypothesis (H_a) stating, "There is an effect of Weight Training on the Ap Chagi kicking performance of extracurricular students at MAN Insan Cendekia OKI," is accepted. From the pretest data, the average (Mean) was 10.9333333, while in the posttest, the average (Mean) was 16.8. The magnitude of the improvement in Ap Chagi kicking performance can be seen from the difference of 5.8666667.

Discussion

The research procedure began with the administration of a pretest aimed at measuring the initial Ap Chagi kicking ability of the students before the implementation of the treatment. Following the pretest, the participants underwent a weight training program conducted over 16 training sessions. After completing the training intervention, a posttest was administered to evaluate the improvement in the accuracy and performance of the Ap Chagi kicks after the treatment period. The statistical analysis using a t-test for the weight training variable showed that the value of $P(T \leq t)$ two-tailed was 0.002634. Since this value is lower than the significance level of 0.05 ($0.002634 \leq 0.05$), the results indicate a statistically significant effect. Therefore, it can be concluded that the implementation of weight training has a significant influence on improving the Ap Chagi kicking performance of students participating in the extracurricular program at MAN Insan Cendekia OKI.

Taekwondo is a martial art that emphasizes the development of self-discipline through the use of both kicking and hand techniques. The term *taekwondo* was first introduced in 1954 as a result of the refinement and integration of several traditional Korean martial arts systems. In Indonesia, taekwondo was officially recognized as a competitive sport during the 11th National Sports Week (PON) held in Jakarta in 1985. On the international stage, taekwondo first appeared in the Olympic Games as a demonstration sport at the 1992 Barcelona Olympics in Spain. Subsequently, the sport gained official Olympic status during the 1996 Olympic Games in Atlanta, United States (F. Fahmy et al., 2021; D. Septian & D. Rohmat, 2024).

The term *taekwondo* originates from the Korean language and is composed of three words: *tae*, meaning to kick; *kwon*, meaning to punch; and *do*, which refers to the way or philosophical path. The concept of *do* reflects the philosophical and meditative dimensions of taekwondo practice, emphasizing ethical values, mental discipline, and personal development. Practitioners are encouraged not only to improve their physical skills but also

to cultivate mental and moral qualities that can be applied in everyday life. The philosophy of taekwondo is built upon five fundamental principles: courtesy, integrity, perseverance, self-control, and indomitable spirit. Historically, these principles promote ideals of peace, mutual respect, and the protection of individuals who may be physically, mentally, or emotionally weaker. Consequently, the practice of taekwondo emphasizes that martial skills should be used responsibly for the benefit of humanity and the promotion of peace (Y. J. Kim et al., 2021, as cited in D. Septian & D. Rohmat, 2024).

Weight training, as one of the fundamental components of physical conditioning, must be performed consistently in order to provide optimal benefits. Regular training frequency is generally recommended at three to five sessions per week, with the intensity adjusted according to specific training objectives. When applied systematically, weight training can significantly contribute to the development of muscular strength, reduce the risk of injury, and enhance overall athletic performance (Nasrulloh et al., 2018, as cited in Prasetyo et al., 2022).

4. CONCLUSION

Based on the results of the study, it can be concluded that the implementation of weight training has a positive and significant effect on improving the Ap Chagi kicking ability of students participating in the Taekwondo extracurricular activities at MAN Insan Cendekia OKI. This is supported by the statistical analysis using a paired sample t-test, which produced a significance value of 0.002634, indicating that the value is lower than the significance level of 0.05. Therefore, the alternative hypothesis is accepted, meaning that weight training contributes significantly to the improvement of Ap Chagi kicking performance.

In addition, the results of this study reinforce the importance of structured physical training programs, particularly weight training, in enhancing athletes' physical abilities such as strength, speed, and kicking accuracy. Consequently, weight training can be considered an effective training method to support the development of taekwondo athletes, especially in improving their kicking techniques.

5. ACKNOWLEDGEMENT

The authors express their sincere gratitude to the editorial team and reviewers of the PPSDP International Journal of Education for their valuable guidance, constructive feedback, and support during the publication process. We also thank the Headmaster of MAN Insan Cendekia OKI for granting permission to conduct this research, as well as the Taekwondo coach and all students who participated in the extracurricular program for their cooperation and commitment during the implementation of the weight training program and data collection. Finally, we extend our appreciation to colleagues, mentors, and family members for their encouragement and support throughout the research process.

6. REFERENCES

- Abdul, P., Pomatahu, A. R., & Podungge, R. (2024). Kemampuan pukulan forehand drive pada permainan tenis meja melalui metode praktik lapangan. *Jurnal Pendidikan Olahraga*, 1(2), 108–116.
- Agnes Sopiayah Maliza, I., Iyakrus, I., Yusfi, H., & Ramadhan, A. (2023). The effect of 20-meter sprint training on dollyo chagi kick speed among taekwondo extracurricular students. *Jurnal Kejaora (Kesehatan Jasmani dan Olah Raga)*, 8(1), 88–93. <https://doi.org/10.36526/kejaora.v8i1.2396>
- Ambia, F., Hariansyah, S., Rinaldy, A., Jafar, M., Bina, U., & Getsempena, B. (2024). Analysis of effectiveness and constraints in the taekwondo athlete recruitment system in PPLPD Aceh. *Jurnal Pendidikan Jasmani dan Olahraga*, 11(2), 84–98.
- Bompa, T. O., & Buzzichelli, C. (2019). *Periodization: Theory and methodology of training* (6th ed.). Human Kinetics.
- Bridge, C. A., Santos, J. F. S., Chaabène, H., Pieter, W., & Franchini, E. (2014). Physical and physiological profiles of taekwondo athletes. *Sports Medicine*, 44(6), 713–733. <https://doi.org/10.1007/s40279-014-0159-9>
- Burdukiewicz, A., Pietraszewska, J., Andrzejewska, J., & Stachoń, A. (2018). Morphological optimization of combat sports athletes. *Journal of Combat Sports and Martial Arts*, 9(2), 75–81.
- Chaabene, H., Hachana, Y., Franchini, E., & Mkaouer, B. (2012). Physical and physiological profile of elite karate athletes. *Sports Medicine*, 42(10), 829–843. <https://doi.org/10.1007/BF03262309>
- Cormie, P., McGuigan, M., & Newton, R. (2011). Developing maximal neuromuscular power. *Sports Medicine*, 41(1), 17–38. <https://doi.org/10.2165/11538500-000000000-00000>
- Enoka, R. M. (2015). *Neuromechanics of human movement* (5th ed.). Human Kinetics.
- Fahmy, F., Arifin, Z., & Nugraha, D. (2021). Development of taekwondo training programs to improve athletes' performance. *Journal of Physical Education and Sports*, 10(3), 112–118.
- Falco, C., Alvarez, O., Estevan, I., Molina-Garcia, J., & Castillo, I. (2014). Influence of the distance in a roundhouse kick's execution time and impact force. *Journal of Biomechanics*, 47(1), 285–289. <https://doi.org/10.1016/j.jbiomech.2013.10.048>
- Haff, G. G., & Triplett, N. T. (2016). *Essentials of strength training and conditioning* (4th ed.). Human Kinetics.
- Hanum, S., & Fajar, M. (2022). The role of taekwondo training in character building and discipline development. *Journal of Sport Education*, 4(2), 56–64.
- Harsono. (2016). *Latihan kondisi fisik*. PT Remaja Rosdakarya.

- Hartati, S., & Kusnanik, N. W. (2017). Extracurricular sports activities and students' physical development. *Jurnal Pendidikan Jasmani Indonesia*, 13(2), 95–102.
- Kim, Y. J., Park, J. H., & Lee, S. H. (2021). Philosophical foundations and ethical values in taekwondo practice. *International Journal of Martial Arts Studies*, 5(1), 33–41.
- Kraemer, W. J., & Ratamess, N. A. (2018). Fundamentals of resistance training. *Medicine & Science in Sports & Exercise*, 50(6), 1258–1263. <https://doi.org/10.1249/MSS.0000000000001511>
- Kuntjiro, B. F. (2020). Racism in sports. *Jurnal Penjakora*, 7(1), 70–78.
- Lee, K. M., & Kim, H. J. (2020). Biomechanical analysis of taekwondo roundhouse kicks. *Journal of Sports Biomechanics*, 19(2), 121–130.
- Leg muscle power, speed, and flexibility correlate with mawashi geri chudan kicking performance in 12–14-year-old boys at Dojo Victori's Karate. (n.d.). *Journal of Indonesian Active in Sports*. <https://jurnal.unimed.ac.id/2012/index.php/jias/article/view/52372>
- Markovic, G. (2007). Does plyometric training improve vertical jump height? A meta-analytical review. *British Journal of Sports Medicine*, 41(6), 349–355. <https://doi.org/10.1136/bjism.2007.035113>
- McArdle, W. D., Katch, F. I., & Katch, V. L. (2019). *Exercise physiology: Nutrition, energy, and human performance* (9th ed.). Wolters Kluwer.
- Muharram, N., & Puspodari, P. (2020). Basic techniques in taekwondo training and athlete development. *Journal of Physical Education Research*, 5(1), 41–49.
- Nasrulloh, A., Wibowo, S., & Hidayat, R. (2018). The effect of resistance training on muscle strength and athletic performance. *Indonesian Journal of Sports Science*, 7(2), 112–120.
- Prasetyo, B. T., Supriatna, S., Fadhli, N. R., & Roesdiyanto, R. (2022). Development of upper body weight training variations for male volleyball athletes packaged in video media. *Sport Science and Health*, 4(8), 680–692. <https://doi.org/10.17977/um062v4i82022p680-692>
- Priambudhi, T. (2023). The effect of drill, multiball, and shadow training on the accuracy of forehand strokes in table tennis athletes. *Jurnal Pendidikan Olahraga*, 6(2), 1572–1577.
- Putri, K. S. I. D., Parwata, I. M. Y., & Arya, I. G. (2022). The relationship between leg muscle strength and dollyo chagi kick ability in taekwondo athletes. *Jurnal Penjakora*, 9(2), 89–98.
- Ratamess, N. (2012). *ACSM's foundations of strength training and conditioning*. Lippincott Williams & Wilkins.
- Roslan, S., & Abdullah, M. (2020). Performance analysis of kicking techniques in taekwondo competitions. *International Journal of Sports Science*, 10(4), 101–108.

- Septian, D., Rohmat, R., & M. R., R. (2024). The effect of resistance band training on increasing leg power in taekwondo kyorugi athletes. *Jurnal Ilmu Keolahragaan*, 5(1), 298–309.
- Sugiyono. (2022). *Metode penelitian kuantitatif, kualitatif, dan R&D* (2nd ed.). Alfabeta.
- Turner, A., & Jeffreys, I. (2010). The stretch-shortening cycle: Proposed mechanisms and methods for enhancement. *Strength and Conditioning Journal*, 32(4), 87–99.
- Wardhani, R., & Yane, S. (2023). The effect of lateral crossover training on increasing taekwondo kicking speed. *Musamus Journal of Physical Education and Sport*, 5(2), 34–41. <https://doi.org/10.35724/mjpes.v5i02.5169>
- Wathoni, A., Rahman, M., & Pratama, F. (2021). Technical analysis of poomsae and kyukpa techniques in taekwondo training. *Journal of Sport Performance*, 3(2), 76–84.
- Young, W., & Farrow, D. (2013). A review of agility training and its application in sport. *Sports Medicine*, 43(11), 1095–1103. <https://doi.org/10.1007/s40279-013-0060-9>
- Zatsiorsky, V. M., & Kraemer, W. J. (2006). *Science and practice of strength training* (2nd ed.). Human Kinetics.