

Research Articles

How effective is circuit training on physical fitness? A high-intensity study in the sport of futsal

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Authors' contribution:

A. Conception and design of the study; B. Acquisition of data; C. Analysis and interpretation of data; D. Manuscript preparation; E. Obtaining funding

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Abstract

Background and Study Aim. Physical fitness is a crucial component that supports optimal performance in sports, including futsal, which demands a combination of endurance, strength, agility and speed. This study aims to analyze the effectiveness of high-intensity circuit training on improving the physical fitness of futsal players.

Material and Methods. The research design used a one group pretest-posttest design method, with participants as many as 8 futsal athletes selected using purposive sampling technique. The study was conducted under partly cloudy weather conditions with real-time temperature of 25.3°C, humidity of 94%, and wind speed of 19.4 km/h. This exercise uses 14 fitness equipment, namely triceps, leg press, front pull down, calf raise, butterfly, leg extension, bench press, sit-up, back-up, standing rowing, squat, back pull down, bicep, and leg curl. Exercises were performed in 3 sets per session with maximum repetitions (1 RM) and rest between sets for 4-5 minutes. The program was implemented for 12 sessions, with full intensity 3 times a week. The instrument was carried out using the Yo-Yo Intermittent Recovery Test Level 1. Data analysis was assisted using the SPSS 26 application

Results. The results showed a significant increase in physical fitness after the treatment was given. The mean pretest and posttest values were statistically different ($t = -4.190$; $p < 0.05$), with an average improvement of -1.36250. High-intensity circuit training proved to be effective in improving the physical fitness of futsal players, which includes an increase in aerobic capacity and physical strength.

Conclusion. This study provides scientific evidence that high-intensity circuit training is an efficient method to improve the physical performance of futsal players. These findings can serve as a reference for coaches in designing relevant and measurable futsal sport needs-based training programs.

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Introduction

Changes in aspects of daily life [González et al., \(2021\)](#) has impacted communities globally due to the Covid-19 pandemic ([Grix et al., 2021](#)), including sports ([Bowes et al., 2021](#); [Horky, 2020](#); [Hughes et al., 2020](#)), so the readiness of sports practitioners must be more mature ([Parnell et al., 2020](#)). Furthermore, since March 2020 in Chile, it has affected the participation of child and youth athletes and in education, physical activity and sport ([Rosales et al., 2020](#)), decreased physical fitness ([Ambroży et al., 2021](#)). These studies illustrate the impact of the Covid-19 pandemic, not only on society but also on sports. Sport makes an important contribution to physical, emotional, and psychological well-being ([Hughes et al., 2020](#)). The great benefits that exercise offers are that it improves health and reduces the risk of disease ([Meo et al., 2021](#)). Therefore, it is necessary to do sports so that the physique is maintained, one of the sports that can be done is a futsal game.

Futsal is a form of intermittent exercise, given that at any time it is necessary to reduce the duration with high intensity ([Costa Miranda et al., 2020](#)). The intermittent nature of the sport requires the use of aerobic and anaerobic energy during exercise. So a futsal player must have high competence in terms of endurance, repeated sprints and leg strength, while technical aspects include high shooting and passing skills, agility and coordination ([Naser et al., 2017](#)). The above review provides evidence that futsal games require good endurance and physical fitness. Lack of physical activity is thought to be a risk factor for various health complaints and perceived stress ([Østerås et al., 2017](#)), cardiovascular disease ([Vancampfort et al., 2019](#)). Furthermore, an article found that physical fitness, resilience, anxiety, and mental health were significantly correlated ([Li et al., 2021](#)). Based on this review, it can be concluded that physical activity greatly affects health. An effective strategy in breast cancer patients to improve physical fitness is to exercise ([Dieli-Conwright et al., 2018](#)). According to [Erliana & Hartoto \(2019\)](#). Physical fitness is influenced by one of the external factors, namely physical activity.

Some studies say physical fitness can be improved by sports activities ([Cocca et al., 2020](#); [Wang et al., 2023](#)). Another opinion says physical fitness is related to achievement ([de Oliveira et al., 2021](#)). Furthermore, the risk of injury in futsal sports is related to physical fitness ([Angoorani et al., 2021](#)). In addition, team sports increase the number of physical demands and their importance ([Mancha-Triguero et al., 2020](#)). It is important to maintain physical fitness in game sports, because when physical fitness increases, it can provide positive things for physical endurance. Physical fitness is a key element that supports optimal performance in a variety of sports, including futsal ([Stubbs-Gutierrez & Medina-Porqueres, 2021](#)). As a high-intensity sport that involves explosive movements such as sprints, dribbles, and quick changes of direction, futsal requires players to have maximum endurance, strength, agility, and speed. In this regard, circuit training has become one of the popular methods as it is able to integrate various components of physical fitness in one training session.

Circuit training is a training method that integrates a series of physical exercises performed sequentially, with minimal rest periods. This method is not only effective in improving cardiovascular endurance, but is also able to improve muscle strength, flexibility, and anaerobic endurance ([Celenay et al., 2024](#)). In the context of futsal, the effectiveness of circuit training is very relevant because it can simulate the high intensity of the game, improve the body's adaptation to physical demands, and optimize player performance on the field ([Muzaki et al., 2020](#)). Several previous studies have shown that high-intensity circuit training has a positive impact on physical fitness, specifically in improving VO2 max capacity, muscle strength, and post-exercise recovery time ([Kumar & Yadav, 2018](#); [Marcos-Pardo et al., 2019](#); [Sumaryanti & Tomoliyus, 2020](#)). However, most existing studies focus on other sports or use moderate training intensities. The novelty of this study lies in the application of high-intensity circuit training specifically designed to meet the specific needs of futsal, such as explosive movement patterns and rapid changes in direction, which have not been studied in depth.

In addition, this study also utilized technology-based approaches to monitoring exercise intensity, such as the use of heart rate measurement devices and activity trackers, to ensure that the exercise was performed in accordance with the specified intensity target. This approach provides

higher data accuracy compared to manual measurement methods, so the results of the study are expected to be more valid and reliable (Celenay et al., 2024). This study not only aims to evaluate the effectiveness of high-intensity circuit training on improving the physical fitness of futsal players, but also to identify the components of physical fitness that are most affected by this training method. Thus, this study is expected to make a significant contribution to the development of evidence-based futsal training programs, as well as a reference for coaches in designing innovative, efficient, and effective training approaches.

Materials and Methods

Participant.

The population of this study were futsal athletes from Mariano Marcos State University, Philippines. The sample was selected using purposive sampling technique, resulting in 8 male futsal athletes as research subjects. The participants were athletes who were active in training and matches. The study was conducted under partly cloudy weather conditions with real-time temperature of 25.3°C, humidity of 94%, and wind speed of 19.4 km/h.

Research Design

Pre-experimental research design. In this study, there was one treatment, so it used a one group pretest posttest design. This study compares between pretest and posttest, the group in this study was given treatment with weight training exercises on physical fitness before and after the treatment given, as for the research design picture as follows.

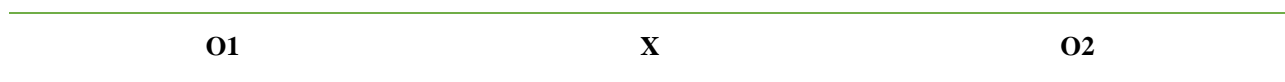


Figure 1. One Group Pretest Posttest Research Design

Research Procedure

The study began with an initial measurement (pretest) to evaluate the initial condition of the participants' physical fitness. This measurement was carried out using the Yo-Yo Intermittent Recovery Test Level 1 in accordance with the established implementation procedures. Furthermore, participants were given treatment in the form of a weight training exercise program.

This exercise uses 14 fitness equipment, namely triceps, leg press, front pull down, calf raise, butterfly, leg extension, bench press, sit-up, back-up, standing rowing, squat, back pull down, bicep, and leg curl. Exercises were performed in 3 sets per session with maximum repetitions (1 RM) and rest between sets for 4-5 minutes. The program was implemented for 12 sessions, with full intensity 3 times a week.

After the treatment was completed, a final measurement (posttest) was conducted to evaluate the improvement of participants' physical fitness. If the results show improvement, then the exercise program is declared effective and can be recommended for trainers and fitness instructors.

Table 1. Circuit Training Program

Exercise	Circuit Training
Intensity	100% or 1 RM
Post/Set	10 Posts / 3 sets per post
Time/Rhythm	10-12 seconds per post / Fast
Rest	4 - 8 minutes

Data Analysis.

Before conducting a different test, it is necessary to conduct a normality prerequisite test, if the data is normal then it is tested with the T test if not then using a non-parametric test. Data is normally distributed if the significance value is $p > 0.05$, and the data is said to be abnormal if the significance

value is $p < 0.05$. If the prerequisite test passes which means the data contributes normally, then the data will be analyzed using the t-test which is used to calculate the effectiveness of the treatment. In this study, the difference test was carried out using the t-test using the paired sample formula and the help of the SPSS 26 application.

Results

This study was conducted 14 stations using a high dose (100%) of 3 sets for 12 meetings. The samples in this study were 8 students who were still active in sports, so that their endurance and physical strength were still maintained. In this case we need to understand that the exercises carried out include high-intensity anaerobics so that we must pay attention to the sample to be used. The equipment used in this study should have a 100% load. In this case there is a 100% tool with maximum reps. The data is described with descriptive and statistical data, this is intended to make it easier to understand the final results in clarifying the research results.

Description of the data recording the testing of the sample who did the exercise in detail can be seen in the table as follows: Pre-test and post-test showed an increase in physical fitness, in the pre-test the average physical fitness was 39.3 while in the post-test 40.7 after weight training with a standard deviation of 2.4. The results can be seen in table 2.

Table 2. Pretest and Posttest Results of Physical Fitness

Parameters	N	Minimum	Maximum	Mode	Mean	Median	SD
Pretest	8	37	42	37.7	39.3	39.4	1.9
Posttest	8	38	44	38.7	40.7	40.3	2.4

Table 3. Shapiro - Wilk Normality Test

Parameters	Asymp (2 tailed)	Distribution
Pretest	0.234	Normal
Posttest	0.570	Normal

After the data has been tested for normality, then the data can proceed to the difference test stage. The t-test used is the t-test by finding the mean difference of one group that has two means. The results can be seen in table 3.

Table 4. Statistical Data Analysis of Paired Sample T-test

Results	Mean	Std. deviation	T	Sig.(2 tailed)
Pretest-Posttest	-1,36250	0,937	-4,190	0.000

The results of the Paired Sample T-test analysis show that there is a significant difference between the pretest and posttest scores. The mean value of the difference between pretest and posttest is -1.36250, which indicates that the overall posttest score is higher than the pretest. The Standard Deviation (Std. Deviation) with a value of 0.937 shows the level of variation in the difference data between pretest and posttest. The smaller the standard deviation value indicates that the data is quite consistent around the average. The T-test result of -4.190 indicates that the mean difference between the pretest and posttest is large enough to be considered statistically significant. Furthermore, the significance value of 0.000 is smaller than 0.05, which means that the mean difference between the pretest and posttest is highly statistically significant. With these results, it can be concluded that the exercises or interventions implemented had a significant effect on the performance improvement measured from pretest to posttest. The results can be seen in table 4.

Discussion

This study aims to analyze the effectiveness of high-intensity circuit training on improving the physical fitness of futsal players. The results of this study indicate that high-intensity circuit training significantly improves the physical fitness of futsal players. This is reflected in the difference in the mean values of the pretest and posttest which shows an increase in overall physical fitness. Circuit training provides positive effects because it is designed to meet the specific needs of futsal sports,

such as endurance, strength, agility, and speed. Circuit training, which incorporates various fitness components in a single session with minimal rest breaks, has long been recognized as an effective method for improving cardiovascular endurance, muscular strength, and anaerobic ability (Muzaki et al., 2020). Other studies have revealed that upper-class students who take part in extracurricular futsal have a moderate level of physical fitness category (Rubiyatno et al., 2023), less category in physical education students (Pellicer-Chenoll et al., 2015).

Circuit training involves a variety of explosive and intensive movements that simulate futsal game activities. The program is designed to include relevant movement patterns, such as short sprints, changes of direction, and a combination of muscle strength training. This combination provides an optimal stimulus to increase aerobic and anaerobic capacity, both of which are very important in supporting the performance of futsal players during matches. According to (Zhan & Cui, 2023) physical fitness can be improved by doing weight training exercises, even traditional games. (Septianto et al., 2024), and bodyweight training with the Tabata method (Turri-Silva et al., 2021). Research conducted by (Kang et al., 2015) obtained the results of a multicomponent training program can improve the physical fitness of elderly women.

A 16-week combined aerobic and resistance training program designed to address metabolic syndrome in ethnically diverse overweight or obese breast cancer survivors also significantly improved quality of life and physical fitness (Dieli-Conwright et al., 2018). Another study confirmed that 4 weeks of high-intensity exercise works well to improve physical fitness, but not immunocyte function (Park et al., 2021). Based on the research review above, it can be concluded that many exercises can be done so that there is an increase in physical fitness, but the intensity of exercise is also a special concern for determining physical fitness.

Physiologically, high-intensity exercise can increase the body's ability to transport and use oxygen efficiently, which is reflected in an increase in VO₂ max capacity (Pamungkas et al., 2022). In addition, this exercise also strengthens the core muscles and extremities, thus helping players in maintaining body stability while performing complex maneuvers (Jiang Wen Ming et al., 2023). The results of this study are in line with previous research showing that circuit training can improve various components of physical fitness, including cardiovascular endurance, muscle strength, and flexibility (Sumaryanti & Tomoliyus, 2020). However, this study adds new evidence by focusing on the application of circuit training in the sport of futsal, which involves high intensity to achieve maximum improvement in physical performance.

In addition to improved fitness, a designed circuit training program also has implications in lowering the risk of injury (Mahesvi et al., 2024; Simplicio et al., 2024). By improving muscle strength and joint stability, the body becomes better equipped to deal with high physical demands, such as sudden direction changes and physical collisions during games. However, it is important to note that the effectiveness of circuit training is also influenced by several factors, such as training intensity, execution technique, and consistency in following the program. In this study, high training intensity and close monitoring of program implementation contributed to the positive results.

This study provides significant practical contributions, especially for coaches and fitness instructors, in designing relevant exercise programs for futsal players. Circuit training can be an effective, efficient and measurable method in improving physical fitness. The success of this program also provides encouragement for the application of similar exercises in other sports that require high levels of physical fitness (Straudi et al., 2014). On the other hand, this study has limitations, including a relatively small sample size and a specific research location at one university. Further research with a larger sample and wider scope is needed to generalize these findings. In addition, physical fitness testing can be improved by using more sophisticated measuring devices to provide more detailed data.

With the results obtained, it can be concluded that high-intensity circuit training is an effective strategy to improve the physical fitness of futsal players. This shows the great potential of this training method in supporting optimal athletic performance.

Conclusion

This study shows that high-intensity circuit training significantly improves the physical fitness of futsal players. This improvement was reflected in the results of pretest and posttest data analysis, which showed a significant difference in physical performance after undergoing the exercise program. Circuit training, which is designed by combining explosive movements, strength, and endurance, is proven to improve cardiovascular endurance, muscle strength, agility, and speed. The effectiveness of this program is supported by the design of the exercises that are relevant to the characteristics of the game of futsal, which requires optimal physical abilities within the intense duration of the game. Circuit training also contributes to injury prevention by strengthening muscles and improving body stability. Thus, circuit training can be an effective and efficient method in improving physical fitness and supporting the performance of futsal players. Implementation of Exercise in a Wider Scope High-intensity circuit training can be applied to other groups of futsal athletes or sports that have similar physical needs to confirm the results of this study. In addition, further research can explore variations in the intensity and duration of circuit training to find the best combination that results in maximum improvement in physical fitness

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Conflict of Interest And Funding

There is no conflict of interest.

References

- Ambroży, T., Rydzik, Ł., Obmiński, Z., Klimek, A. T., Serafin, N., Litwiniuk, A., Czaja, R., & Czarny, W. (2021). The impact of reduced training activity of elite kickboxers on physical fitness, body build, and performance during competitions. *International Journal of Environmental Research and Public Health*, 18(8), 4342. <https://doi.org/10.3390/ijerph18084342>
- Angoorani, H., Haratian, Z., Farmanara, H., & Jahani, P. (2021). Lower physical fitness is associated with injuries in iranian national futsal teams: A prospective study. *Asian Journal of Sports Medicine*, 12(3), 1–9. <https://doi.org/10.5812/ASJSM.110778>
- Bowes, A., Lomax, L., & Piasecki, J. (2021). A losing battle? Women's sport pre- and post-COVID-19. *European Sport Management Quarterly*, 21(3), 443–461. <https://doi.org/10.1080/16184742.2021.1904267>
- Cocca, A., Verdugo, F. E., Cuenca, L. T. R., & Cocca, M. (2020). Effect of a game-based physical education program on physical fitness and mental health in elementary school children. *International Journal of Environmental Research and Public Health*. <https://doi.org/10.3390/ijerph17134883>
- Costa Miranda, B. H., Santos Cerqueira, M., & Bouzas Marins, J. C. (2020). Nível De Aptidão Física De Atletas Universitários De Futsal. / Level Of Physical Fitness Of University Futsal Athletes. *Brazilian Journal of Soccer Science / Revista Brasileira de Futebol*, 13(1), 47–72.
- de Oliveira, I. M., Vila, M. H., Burgos-Martos, F. J., & Cancela-Carral, J. M. (2021). Physical fitness in Spanish naval cadets. A four-year study. *International Maritime Health*. <https://doi.org/10.5603/IMH.2021.0002>

- Dieli-Conwright, C. M., Courneya, K. S., Demark-Wahnefried, W., Sami, N., Lee, K., Sweeney, F. C., Stewart, C., Buchanan, T. A., Spicer, D., Tripathy, D., Bernstein, L., & Mortimer, J. E. (2018). Aerobic and resistance exercise improves physical fitness, bone health, and quality of life in overweight and obese breast cancer survivors: A randomized controlled trial 11 Medical and Health Sciences 1117 Public Health and Health Services. *Breast Cancer Research*, 20(1), 1–10. <https://doi.org/10.1186/s13058-018-1051-6>
- Erliana, E., & Hartoto, S. (2019). Hubungan Aktivitas Fisik Terhadap Tingkat Kebugaran Jasmani Siswa. *Jurnal Pendidikan Olahraga Dan Kesehatan*, 7(2), 225–228. <https://jurnalmahasiswa.unesa.ac.id/index.php/9/article/view/27444>
- González, L. M., Devís-Devís, J., Pellicer-Chenoll, M., Pans, M., Pardo-Ibañez, A., García-Massó, X., Peset, F., Garzón-Farinós, F., & Pérez-Samaniego, V. (2021). The impact of COVID-19 on sport in twitter: A quantitative and qualitative content analysis. *International Journal of Environmental Research and Public Health*, 18(9), 4554. <https://doi.org/10.3390/ijerph18094554>
- Grix, J., Brannagan, P. M., Grimes, H., & Neville, R. (2021). The impact of Covid-19 on sport. *International Journal of Sport Policy and Politics*, 13(1), 1–12. <https://doi.org/10.1080/19406940.2020.1851285>
- Horky, T. (2020). No sports, no spectators–no media, no money? The importance of spectators and broadcasting for professional sports during COVID-19. *Soccer and Society*, 22(1–2), 96–102. <https://doi.org/10.1080/14660970.2020.1790358>
- Hughes, D., Saw, R., Perera, N. K. P., Mooney, M., Wallett, A., Cooke, J., Coatsworth, N., & Broderick, C. (2020). The Australian Institute of Sport framework for rebooting sport in a COVID-19 environment. In *Journal of Science and Medicine in Sport* (pp. 23(7),639-663). <https://doi.org/10.1016/j.jsams.2020.05.004>
- Jiang Wen Ming, J., Alhussin Alali, A., Abd Malek, N. F., Madarsa, N. I., Baki, M. H., & Mohamad, N. I. (2023). Impact of Hand Grip and Sit-And-Reach Exercises in Children Aged 6-7 Years. *Journal of Coaching and Sports Science*, 2(2), 86–92. <https://doi.org/10.58524/002023227200>
- Kang, S., Hwang, S., Klein, A. B., & Kim, S. H. (2015). Multicomponent exercise for physical fitness of community-dwelling elderly women. *Journal of Physical Therapy Science*, 27(3), 911–915. <https://doi.org/10.1589/jpts.27.911>
- Li, Y., Xia, X., Meng, F., & Zhang, C. (2021). The association of physical fitness with mental health in children: A serial multiple mediation model. *Current Psychology*, 1–10. <https://doi.org/10.1007/s12144-020-01327-6>
- Mahesvi, H., Sukarmin, Y., Suhartini, B., Bartik, P., Hansdorfer-Korzon, R., & Adil, H. M. (2024). How does ali satia graha and thai massage method compare? Study on pain and range of motion of chronic ankle injury. *Tanjungpura Journal of Coaching Research*, 2(3), 124–130. <https://doi.org/10.26418/tajor.v2i3.65878>
- Mancha-Triguero, D., Martín-Encinas, N., & Ibañez, S. J. (2020). Evolution of Physical Fitness in Formative Female Basketball Players: A Case Study. *Sports*, 8(7), 97. <https://doi.org/10.3390/sports8070097>
- Meo, S. A., Abukhalaf, A. A., Alomar, A. A., Alessa, O. M., Sumaya, O. Y., & Meo, A. S. (2021). Prevalence of prediabetes and type 2 diabetes mellitus in football players: A novel multi football clubs cross sectional study. *International Journal of Environmental Research and Public Health*, 18(4), 1763. <https://doi.org/10.3390/ijerph18041763>

- Muzaki, R., Maliki, O., & Kusuma, B. (2020). The Effect of Circuit Training on Speed, Agility and Endurance on UKM Futsal Male Players in Universitas PGRI Semarang. *Journal of Sport Coaching and Physical Education*. <https://doi.org/10.15294/jscpe.v5i1.36890>
- Naser, N., Ali, A., & Macadam, P. (2017). Journal of Exercise Science & Fitness Physical and physiological demands of futsal. *Journal of Exercise Science & Fitness*, 15(2), 76–80. <https://doi.org/10.1016/j.jesf.2017.09.001>
- Østerås, B., Sigmundsson, H., & Haga, M. (2017). Physical fitness levels do not affect stress levels in a sample of Norwegian adolescents. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2017.02176>
- Pamungkas, A. R., Wijayanti, N. P. N., Vai, A., & Ittaqwa, I. (2022). Development of Smartphone-Based Athlete Physical Fitness Applications During Work From Home. *Journal of Coaching and Sports Science*. <https://doi.org/10.58524/jcss.v1i1.107>
- Park, S. K., Lee, K. S., Heo, S. J., & Jee, Y. S. (2021). Effects of high intensity plank exercise on physical fitness and immunocyte function in a middle-aged man: A case report. *Medicina (Lithuania)*, 57(8), 845. <https://doi.org/10.3390/medicina57080845>
- Parnell, D., Widdop, P., Bond, A., & Wilson, R. (2020). COVID-19, networks and sport. In *Managing Sport and Leisure* (pp. 1–7). <https://doi.org/10.1080/23750472.2020.1750100>
- Pellicer-Chenoll, M., Garcia-Massó, X., Morales, J., Serra-Añó, P., Solana-Tramunt, M., González, L. M., & Toca-Herrera, J. L. (2015). Physical activity, physical fitness and academic achievement in adolescents: A self-organizing maps approach. *Health Education Research*, 30(3), 436–448. <https://doi.org/10.1093/her/cyv016>
- Rosales, C. K., Erazo, P. V., Valderrama, J. F., González, J. B., Terneus, D. H., Stagno, R. U., Sarquis, F. J., Reyes, A. S., Miranda, F. V., Plaza, R. S., & Contreras, L. V. (2020). Sport COVID-19 orientations: Recommendations for return to physical activity and sports in children and adolescents. *Revista Chilena de Pediatría*, 91(7), 75–90. <https://doi.org/10.32641/rchped.vi91i7.2782>
- Rubiyatno, Perdana, R. P., Fallo, I. S., Arifin, Z., Nusri, A., Suryadi, D., Suganda, M. A., & Fauziah, E. (2023). Analysis of differences in physical fitness levels of extracurricular futsal students: Survey studies on urban and rural environments. *Pedagogy of Physical Culture and Sports*, 27(3), 208–214. <https://doi.org/10.15561/26649837.2023.0304>
- Septianto, I., Sumaryanti, S., Nasrulloh, A., Sulistiyono, S., Nugraha, H., Ali, M., Ramadhani, A. M., Dewantara, J., Haniyyah, N., Fauzi, F., Suryadi, D., Ardian, R., & Subarjo, S. (2024). Traditional games for physical fitness: an experimental study on elementary school students. *Retos*, 54, 122–128. <https://doi.org/10.47197/retos.v54.104177>
- Simplicio, C. L., Purita, J., Murrell, W., Santos, G. S., Santos, R. G. dos, & Lana, J. F. S. D. (2024). Physiotherapy techniques used in injury treatment: a systematic review of tennis elbow. *Tanjungpura Journal of Coaching Research*, 2(3), 114–123. <https://doi.org/10.26418/tajor.v2i3.86823>
- Stubbs-Gutierrez, A., & Medina-Porqueres, I. (2021). Anthropometric characteristics and physical fitness in elite futsal male players. A systematic review. *Movement & Sport Sciences - Science & Motricité*. <https://doi.org/10.1051/sm/2020011>
- Sumaryanti, S., & Tomoliyus, T. (2020). The effect of linear loading circuit training on physical fitness. *Gazzetta Medica Italiana Archivio per Le Scienze Mediche*. <https://doi.org/10.23736/S0393-3660.18.04005-6>

Turri-Silva, N., Vale-Lira, A., Verboven, K., Quaglioti Durigan, J. L., Hansen, D., & Cipriano, G. J. (2021). High-intensity interval training versus progressive high-intensity circuit resistance training on endothelial function and cardiorespiratory fitness in heart failure: A preliminary randomized controlled trial. *PloS One*, *16*(10), e0257607. <https://doi.org/10.1371/journal.pone.0257607>

Vancampfort, D., Vandael, H., Hallgren, M., Probst, M., Hagemann, N., Bouckaert, F., & Van Damme, T. (2019). Physical fitness and physical activity levels in people with alcohol use disorder versus matched healthy controls: A pilot study. *Alcohol*, *76*, 73–79. <https://doi.org/10.1016/j.alcohol.2018.07.014>

Wang, H., Liu, Y., Pei, Z., Liang, J., & Ding, X. (2023). The influence of Tai Chi exercise on the subjective well-being in the aged: the mediating role of physical fitness and cognitive function. *BMC Geriatrics*, *23*(1), 636. <https://doi.org/10.1186/s12877-023-04366-3>

Zhan, C., & Cui, P. (2023). Impacts of weight training on physical fitness in table tennis. *Revista Brasileira de Medicina Do Esporte*. https://doi.org/10.1590/1517-8692202329012023_0036

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