

Implementation of physical fitness learning model through play approach: how does it impact on Islamic school students of Madrasah Tsanawiyah?

Aplicación del modelo de aprendizaje de la condición física mediante el juego: ¿cómo repercute en los alumnos de la escuela islámica de Madrasah Tsanawiyah?

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Abstract. Physical education is a compulsory content in the education curriculum under the ministry of religious affairs in Indonesia, especially for junior high school students. Learning to implement the curriculum launched by the government, however, the implementation of this curriculum still requires elaboration to be more operational and can be implemented in schools. The issue of low fitness, learning content and student motivation in physical education is still an operational concern. Creativity is needed so that physical education learning is quality, interesting and able to improve fitness in fun and quality learning. The purpose of seeing the implementation of game-based physical education learning for student fitness development. The research method taken is a type of quantitative research, namely quasi-experimental design with a two-group pre test-post test control group design. The research was conducted on 40 students with two groups. Experimental group 20 students and control group 20 Students. Fitness instrument with 800 meter test for women and 1000 for men. Data analysis using independent sample t-test. The results showed that there was a significant effect on students' physical fitness in the experimental group before treatment (pre-test) and after treatment (post-test), seen from the Sig value of $0.000 < \alpha 0.05$. Furthermore, the control group also experienced an increase between before and after treatment, as evidenced by the sig value. 0,032. The results showed that there was an increase in fitness shown by both the control and experimental groups. It is proven that the experimental group is better than the control group with a comparison of 51% increase in the control group and 62% in the experimental group.

Keywords: Learning Model, Play Approach, Physical Education, Physical Fitness, Islamic School

Resumen. La educación física es un contenido obligatorio del plan de estudios del ministerio de asuntos religiosos de Indonesia, especialmente para los estudiantes de secundaria. Aprender a aplicar el plan de estudios puesto en marcha por el gobierno, sin embargo, la aplicación de este plan de estudios todavía requiere elaboración para ser más operativo y se puede aplicar en las escuelas. La cuestión de la baja forma física, el contenido del aprendizaje y la motivación de los alumnos en educación física sigue siendo una preocupación operativa. Se necesita creatividad para que el aprendizaje de la educación física sea de calidad, interesante y capaz de mejorar la forma física en un aprendizaje divertido y de calidad. El propósito de ver la aplicación del aprendizaje de la educación física basado en el juego para el desarrollo de la aptitud física de los estudiantes. El método de investigación adoptado es un tipo de investigación cuantitativa, a saber, un diseño cuasiexperimental con un diseño de grupo de control de dos grupos preprueba-postprueba. La investigación se llevó a cabo con 40 estudiantes en dos grupos. Grupo experimental 20 estudiantes y grupo de control 20 estudiantes. Instrumento de fitness con prueba de 800 metros para las mujeres y 1000 para los hombres. Análisis de datos mediante la prueba t de muestras independientes. Los resultados mostraron que hubo un efecto significativo en la forma física de los estudiantes en el grupo experimental antes del tratamiento (pre-test) y después del tratamiento (post-test), visto desde el valor Sig de $0,000 < \alpha 0,05$. Además, el grupo de control también experimentó un aumento entre antes y después del tratamiento, como demuestra el valor sig. 0,032. Los resultados mostraron que hubo un aumento en la aptitud física mostrada tanto por el grupo de control como por el grupo experimental. Se comprueba que el grupo experimental es mejor que el grupo de control con una comparación del 51% de aumento en el grupo de control y del 62% en el grupo experimental.

Palabras clave: Modelo de Aprendizaje, Enfoque Lúdico, Educación Física, Condición Física, Escuela Islámica.

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Introduction

Physical education has relatively the same interests as other educational programs, namely developing three main domains: psychomotor, affective, and cognitive (Aziz, Okilanda, Permadi, et al., 2023; Aziz, Okilanda, Rozi, et al., 2023; Suryadi, Okilanda, Nofrizal, et al., 2024). Physical education is a medium for the development of motor skills, physical abilities, knowledge and reasoning, appreciation of social values, and habituation of healthy lifestyles in order to stimulate balanced growth and development (Damian Puling, 2022). Physical education directs students to learn movements, these movements are related to basic movements such as jumping, throwing, running, and other movements carried out by games, gymnastics, martial arts,

and swimming (Juni Samodra et al., 2024; Samodra et al., 2023; Suryadi, Nasrulloh, Yanti, et al., 2024). Physical education is an overall approach through physical activity to encourage healthy living habits and form movement skills towards harmonious and balanced physical, spiritual, mental, social intellectual and emotional growth and development (Mashud et al., 2023; Yanti et al., 2024).

Based on the above opinion, physical education can be interpreted as an education unit that also organizes physical education, namely Madrasah. Ministry of Religious Affairs of the Republic of Indonesia (2013) through Regulation of the Minister of Religious Affairs Number 90 of 2013 concerning the Implementation of Madrasah Education, Article 24 Paragraph 1 "Curriculum Structure of Madrasah Ibtidaiyah (MI)", Article 25 Paragraph 1 "Curriculum Structure

of Madrasah Tsanawiyah (MTs)" and Article 26 Paragraph 1 "Curriculum Structure of Madrasah Aliyah (MA)", includes physical education and sports in its curriculum content. The process of learning physical education and sports in Madrasah education units also has its own problems.

These problems are illustrated by various studies conducted in madrasah education units (education under the auspices of Islam) in relation to physical education. Student fitness levels are still low (one of the MTs in South Parigi district) (Murtono et al., 2022). Student learning motivation (MAN) in the "sufficient" category (Islamamin et al., 2022).. The majority of learning outcomes are in the "sufficient" category (one of the Bekasi city MANs) (Alabba et al., 2021). Teachers have several problems in developing media and teaching materials (Taopiqurohman et al., 2022). The level of teacher activeness during the Covid 19 pandemic has not run optimally (Tanri et al., 2023). Implementation of learning in the moderate category (Hidayat et al., 2020). Various problems with physical fitness levels, student learning motivation, teaching media and materials, teacher activity levels, and the implementation of physical education learning have not gone well.

Physical fitness is of course always related to the various conceptions that have been described by experts in various literatures, the following are the various conceptions of physical fitness by experts contained in various literatures. The term physical fitness is defined based on the study; is a set of attributes to perform physical activities (Kokkinos, 2010; Lubis, 2018; Vancampfort et al., 2019), being able to go through daily life without fatigue and still be able to do other activities (Hoeger & Hoeger, 2018; Pan et al., 2022; Waluyo, 2023; Widiastuti, 2011). It is the ability of the body system to work efficiently and be healthy in daily activities (Corbin, 2014). Physical fitness is the physical ability to work optimally and reduce the risk of health problems (Howley & Franks, 2019).

This fitness is related to exercise (Suryadi, Komaini, Suganda, et al., 2024; Suryadi, Nasrulloh, Haryanto, et al., 2024; Suryadi, Susanto, Faridah, et al., 2024) physical education and sport professions (Siedentop & Mars, 2012), related to health and movement skills (Jeng et al., 2017; Siedentop & Mars, 2012), related to biomotor (Bloemen et al., 2017) (Nabilah & Ardyanto, 2020) (Bompa & Buzzichelli, 2019), coordination (Mashud et al., 2024). Furthermore, physical fitness, cardio, biomotor, and body composition (Liguori & Medicine, 2017), sport skills (Indrayana & Yuliawan, 2019). Experimental studies by providing physical activity before breakfast and studying provide evidence that this has a positive effect on fitness and reading ability (Kulp & Zhu, 2021) Daily physical activity has been shown to improve fitness as well as academic achievement (Chabibi Arif et al., 2019). (Chabibi Arif et al., 2021). Students with high activity and low BMI tend to have high academic grades (Pellicer-Chenoll et al., 2015).

In Taiwan, fitness is an issue, and efforts are being made to reduce student obesity (Shih, 2016). In relation to this problem associated with student fitness, many studies have

been conducted that prove how this fitness can be achieved. It is proven that games are better in efforts to improve student fitness (Khairuddin et al., 2023)(Khairuddin et al., 2023), modified games (Khairuddin, 2014), as well as traditional games (Kusuma et al., 2021), sports activities (Lo et al., 2017). The more activities that are carried out have a high intensity, the more it will improve cardio and muscle fitness in adolescent students (Rubiyatno et al., 2023; Sato et al., 2021), the more active students are, the better their fitness level will be (Rizqika Rizal et al., 2022; Suratmin et al., 2024).

Physical activity (walking, running, exercising, playing) in the built environment or in this case city parks, urban forests, and other green open spaces, can significantly improve physical fitness (Lu et al., 2022). The novelty above is also reinforced based on a summary analysis of previous research relevant to this study: Physical education learning models through the play approach are: (1) whose game is fast, (2) cloth volleyball circuit game, (3) soccer circuit game, (4) basketball circuit game) circuit (Susilawati & Nur Moh Kusuma Atmaja, 2023). Traditional game-based learning development model to improve physical fitness (Lestari, 2021) & (Bile et al., 2021), increasing student activeness with the play method (Hardinata et al., 2024; Harianto et al., 2023), pole circuit games to improve fitness (Sitompul & Sholihamia, 2020), low organized games on fitness (R. A. Hidayat et al., 2020)..

What is the importance of fitness for students? Studies have shown some very surprising things. Fitness and weight status were found to be associated with grade 7 student learning outcomes (Sardinha et al., 2014), with low fitness levels at risk of low academic grades (Cumillaf et al., 2015), as well as the risk of failing in school (Shaw et al., 2015), male or female students with high fitness will have low stress and good academic grades (Ushijima et al., 2016). Fitness contributes positively to academic achievement (Alvarez-Bueno et al., 2017), students (Bara Crystina L. B. P et al., 2019; Hafsah et al., 2018; Han, 2018; Matejek & Planinšec, 2022).

Other research evidence states, It is important to improve physical fitness in female students, this can contribute to academic achievement especially junior secondary school students. (Kyan et al., 2018)(Kyan et al., 2018), which is also the case in Taiwan (Hsieh et al., 2018). Meanwhile, a study conducted in Japan stated that physical fitness is strongly influenced by physical activity (Kyan et al., 2019; Mashud et al., 2024; Septianto et al., 2024; Suryadi et al., 2023). Likewise, a study conducted in Malaysia found that cardio fitness and flexibility have an effect on academic achievement (Ismail et al., 2020). These studies prove that fitness has an important impact on students' academic achievement. This study has piloted a number of games that are suitable for junior high school students, especially in schools that are under the auspices of the Ministry of Religious Affairs. Schools that specifically adhere to the Islamic religion in conducting the education process.

The innovation in this research lies in the Physical Fitness Learning Model through the Play Approach specifically designed for Madrasah Tsanawiyah (MTs) students, utilizing the built environment. Traditionally, play-based learning models have relied on traditional games or adaptations of existing games. However, there has been no prior research or effort to develop learning models that leverage the built environment to enhance the learning process, particularly to improve students' physical fitness. This approach not only supports the research goals but also serves as an alternative method for physical education, especially in educational settings with limited facilities and infrastructure, such as in Indonesia. Additionally, it aims to raise students' environmental awareness by integrating environmental learning into the curriculum.

Research Methodology

Participants

The population in this study were students from 5 MTS schools in the Jakarta area. Determination of the sample using purposive sampling so that a sample of 40 students was obtained which was divided into two groups. Experiments on 40 students consisting of 20 control group students and 20 experimental groups.

Research Design

The research method taken is a type of quantitative research, namely quasi-experimental design with a two-group pre test-post test control group design. In this study, the experimental group consisted of 20 students and a control group of 20 students. The experimental group received game-based physical education learning. The control group with physical education as usual. The research groups both received treatment 16 times a meeting. The experimental group with physical education treatment with games and the physical education control group followed the ongoing learning.

Table 1.

Subject	Pres-Test	Treatment	Post-Test
Treatment Group	O ₁	P	O ₁
Section		Overall	
Control Group	O ₂	K	O ₂

Table 2.

Value	Male	Value	Female
	1000 meter run		800 meter run
5	s.d - 3'04"	5	s.d - 3'06"
4	3'05" - 3'53"	4	3'07" - 3'55"
3	3'54" - 4'46"	3	3'56" - 4'58"
2	4'47" - 6'04"	2	4'59" - 6'40"
1	6'05" - etc.	1	6'41" - etc

Instrument

This research instrument uses the 800 meter running test for female students and 1000 meters for male students. With the assessment norms referring to the Indonesian physical fitness test norms as in table 2.

Data Analysis

Data were presented in the form of measures of central tendency. The next step is analyzing the data with a t-test and conducting a Parametric pre-test as a preliminary. The analysis of the experiment was carried out by testing the difference between the pre-test and post-test groups with the T test with the previous normality and homogeneity test , using SPSS 26 software.

Results

The following are the results of the data analysis obtained from the pre-test and post-test of the experimental group. The descriptive analysis results in Table 3 show that the average physical fitness score of students in the experimental group increased from the pre-test to the post-test. Similarly, the control group also showed an increase in their average physical fitness score from the pre-test to the post-test. However, there is a notable difference between the post-test average scores of the experimental group and the control group. The improvement in travel time is expressed in minutes, indicating that a lower value reflects better performance. The table demonstrates a decrease in time for the mean, minimum, and maximum values, suggesting an improvement in the ability to complete the running distance within a set time, which also indicates an increase in student fitness.

To determine the significance between the pre-test and post-test scores of the experimental group, the Paired Samples Test (paired t-test) was used, addressing the first hypothesis. To analyze the significance of the difference in impact between the post-test scores of the experimental and control groups, the Independent Samples Test (unpaired t-test) was used, addressing the second hypothesis. To evaluate the significance of the model, the N-Gain Score Test was used, addressing the third hypothesis. Before conducting these analytical tests, prerequisite tests were applied: the normality test using the Kolmogorov-Smirnov Test (with $\text{sig} > \alpha 0.05$) and the homogeneity test using the Levene statistic (with a sig value > 0.05). The results of the normality test indicate that the pre-test and post-test scores for both the experimental and control groups are normally distributed. Detailed results are shown in Table 4. The homogeneity test results in Table 5 show that the post-test scores of both the experimental and control groups are homogeneous, meaning all groups have the same variance.

The results of the Paired t-test in table 5, it can be concluded that there is a significant effect on the physical fitness of students in the experimental group before treatment (pre-test) and after treatment (post-test), seen from the Sig value of $0.000 < \alpha 0.05$. Even so, the control group also experienced an increase between before and after treatment, as evidenced by the sig value. 0,032. Furthermore, between the control and experimental post-test groups, the free sample test was carried out, it turned out to have the

same results with a sig value. $0,083 > 0,05$. Judging from this, it can be stated that the two groups both experienced an increase in fitness. The next analysis in the Model Effectiveness Test is the N-Gain Score Test to determine the meaningfulness of using the "Physical Fitness Learning Model Through the Play Approach for Madrasah Tsanawiyah (MTs) Students".

The requirement for the application of the N-Gain Score Test is when the results of the Unpaired t-test between the Post-test of the experimental group and the Post-test of the control group have a significant difference in influence, while in this study these conditions have been achieved.

Table 3. Results of Pre-test and Post-test Descriptive Analysis of Experimental Group

Result	N	Minimum	Maximum	Mean	Std. Deviation
Pre_Experiment Group	20	4,48	6,24	5,4395	,50561
Pre_Control_group	20	4,41	6,29	5,4020	,50568
Post_Experiment Group	20	3,18	4,58	4,0335	,42193
Post_Control_group	20	3,11	5,23	4,3040	,55838

Table 4. Data Normality Test Results

Group	Test	P	Significance	Conclusion
Experiment	Pre-test	0,179	0,093	Normal
	Post-test	0,177	0,099	Normal
Control	Pre-test	0,178	0,098	Normal
	Post-test	0,175	0,111	Normal

Table 5. Results of Data Homogeneity Test

Variables	Levene Statistics	df1	df2	Sig	Conclusion
Post-test of experimental group and Post-test of control group	0,180	1	38	0,674	Homogeneous

Table 6. Results of Paired t-test of Pre-test and Post-test of Experimental and Dick Groups

Group	Variables	Df	Sig	α
Experiment	Pretest	19	0	0.05
	Posttest			
Control	Pretest	19	0.032	0.05
	Posttest			
Experiment and dick	Post test	38	0.083	0.05
	Post test			

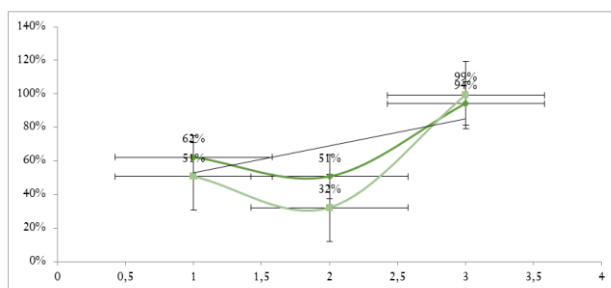


Figure 1 Percentage of N-Gain Score Test Results

The N-Gain Score Test results in Figure 1, show that the average N-gain score for the experimental group obtained a value of 62% including in the "moderately effective" category, with a minimum N-Gain Score value of 51% and a maximum N-Gain Score of 94%. Meanwhile, the average

N-Gain Score for the control group is 51%, including in the "less effective" category, with a minimum N-Gain Score value of 32% and a maximum N-Gain Score value of 99%.

Discussion

This study aims to look at the implementation of game-based physical education learning for student fitness development. The results of the experiment found that it was also proven by the results of the experimental test which showed that there were differences in the research sample before and after the experiment with reference to the shorter travel time. It was proven stronger by the results of the difference test before and after the treatment given for 16 meetings. The results of the model effectiveness test in this study should be in line with various previous studies that also used the play approach to improve students' physical fitness. The physical education learning model through a play approach packaged in the form of a circuit has proven effective for improving students' physical fitness (Septianto et al., 2024).

The traditional game-based learning development model has been shown to be effective for improving students' integrated physical fitness (Bile et al., 2021; Lestari, 2021; Ma'ruf, 2019; Septianto et al., 2024). Next Modification of basic movements through the application of pole circuit games in an effort to improve students' physical fitness (Sitompul & Sholihamia, 2020). The effect of low organized games on the degree of physical fitness of elementary school students (R. A. Hidayat et al., 2020).. Physical activity-based learning in tolerance character through traditional games (Putri, 2019).

There is no contradiction between the findings of the model effectiveness test in this study and other studies that have similar themes. The significant increase in students' physical fitness after running the Physical Fitness Learning Model through the Play Approach for Madrasah Tsanawiyah (MTs) Students, cannot be separated from the utilization of the built environment. School-age children to adolescents are very interested and more likely to do physical activity, and achieve the highest level of physical activity, when using the built environment because it is located outdoors (Oreskovic et al., 2015). Characteristics of the built environment appear important for supporting physical activity participation and favoring increased physical activity duration (McCormack, 2017). Safe, walkable and aesthetically pleasing neighborhoods with access to destinations and services overall and specifically influence people's participation in PA (physical activity) (Barnett et al. 2017). The importance of access to places and opportunities for activity in the immediate neighborhood and in the larger community can increase participation in physical activity and social life in childhood (Nordbø et al., 2019). The presence and range of facilities in the built environment can influence children's physical activity behavior (Lambert et al., 2019). The built environment is highly recommended as a means to promote PA among children/adolescents, especially in the face of the

global physical inactivity crisis (Prince et al., 2022).

Apart from being a vehicle for the success of the Physical Fitness Learning Model through the Play Approach for Madrasah Tsanawiyah (MTs) Students, the use of the built environment has other benefits, namely as an alternative in carrying out the physical education learning process, especially in educational units that are still very minimal in facilities and infrastructure, especially in Indonesia. This research is very important because based on previous studies, when children are active then fitness increases, it is proven to improve academic achievement. Among the research results evidence of this is according to (Asigbee et al., 2018). Physical activity is significantly associated with academic achievement, cardiorespiratory fitness is associated with academic achievement level (De Almeida Santana et al., 2017). That physical fitness correlates with students' academic achievement (Bara Crystina L. B. P et al., 2019; Hafsa et al., 2018; Han, 2018; Matejek & Planinšec, 2022; Weemer & Ayodele, 2021). Specifically body strength is not correlated with academic achievement (Gima & Seki, 2019), student fitness was found to have an effect on cognitive health (Latino et al., 2021).

Physical activity has been found to relieve stress and release happy hormones, which is thought to improve academic performance (Alghadir et al., 2020) even a sizable experimental study was conducted to prove whether small exercise training activities performed for only 10-25 minutes have an effect on students' academic achievement, and the results were positive (Li & Zhang, 2022; Takehara et al., 2021). Simple movements only had a low correlation with academic achievement, while complex movements were found to have a positive effect on academic achievement in female students, but not in male students. (Chung et al., 2021).

Subsequent studies have suggested that obesity has a sequential effect on fitness and academic (Morita et al., 2016) According to this study, by engaging in physical activity or exercise, obesity can be overcome. Furthermore, the intensity and frequency of exercise during motion learning helps to improve fitness, with this involvement significantly affecting academic achievement (Adi, 2023). Participation in sports positively improves children's mental health, social skills and academics (A'mir et al., 2023). Other evidence suggests that active students are fitter and have better academic performance (Arboix-Alió et al., 2022). There is a positive relationship between physical activity and cognitive function of students (Amin et al., 2023). There is a relationship between physical fitness (especially strength) and academic achievement, but not aerobic ability (de Almeida Santana et al., 2023). Physical activity directly improves cardiovascular and pulmonary fitness, as well as coordination of movement, which also improves academic achievement (Tanineh & Halaweh, 2023). The results of this study enrich the results of development research oriented towards efforts to improve student fitness through a series of games. It is further hoped that with an increase in physical fitness, the ability to learn will increase and will result in

improved academic learning outcomes in addition to movement fitness or body fitness.

Conclusion

The results of this study prove that in the experimental group there was an increase in fitness, as well as in the control group. The increase that occurred based on the N gain test was greater than the control group, so it can be understood that the game-based learning model is effective for improving fitness. The results of the study provide additional information and scientific treasures in the form of a Physical Fitness Learning Model through a Play Approach for Madrasah Tsanawiyah (MTs) Students to improve students' physical fitness. For teachers, it has facilitated and expedited the learning process, for students to facilitate and accelerate the learning process. Provides a contribution to scientific thinking that can be accounted for the truth. so it is possible for scientists and other researchers to develop physical fitness learning models to be more specific, interesting, and useful. Further research recommendations can compare the physical fitness learning model through the play approach with other learning models and of course with a wider sample.

References

- A'mir, O. A. R., Almobasher, Z. M., & Abbas, I. M. (2023). Health-related physical fitness and its relationship to the level of academic achievement among a sample of secondary school students in the city of Amman. *International Journal of Membrane Science and Technology*, 10(2), 112–121. <https://doi.org/10.15379/ijmst.v10i2.1176>
- Adi, S. (2023). A new vision of learning frequency in physical education subjects contributes to improved self-concept, physical fitness, and academic achievement. *Journal of Physical Education and Sport*, 23(3), 658–664. <https://doi.org/10.7752/jpes.2023.03081>
- Alabba, S., Julianti, R. R., & Nugroho, S. (2021). Survei Efektivitas Penggunaan Metode Penugasan dalam Pembelajaran Penjas (PJOK) Selama Pembelajaran Jarak Jauh di Madrasah Aliyah Negeri 1 Kota Bekasi (MAN). *Jurnal Ilmiah Wahana Pendidikan* <https://jurnal.unibrah.ac.id/index.php/JIWP>, 7(1), 168–175. <https://doi.org/10.5281/zenodo.5636192>
- Alghadir, A. H., Gabr, S. A., & Iqbal, Z. A. (2020). Effect of gender, physical activity and stress-related hormones on adolescent's academic achievements. *International Journal of Environmental Research and Public Health*, 17(11), 1–14. <https://doi.org/10.3390/ijerph17114143>
- Alvarez-Bueno, C., Pesce, C., Cervero-Redondo, I., Sanchez-Lopez, M., Garrido-Miguel, M., & Martinez-Vizcaino, V. (2017). Academic achievement and physical activity: A meta-analysis. *Pediatrics*, 140(6),

- 239–252. <https://doi.org/10.1542/peds.2017-1498>
- Amin, N. binti M., Mohamed, M. B., & Mohamed, A. M. D. (2023). The Influence of Physical Activity on Academic Performance Among Students-Athletes: A Case in a Secondary Public School. *ACPES Journal of Physical Education, Sport, and Health (AJPESH)*, 3(1), 26–33. <https://doi.org/10.15294/ajpesh.v3i1.70291>
- Arboix-Alió, J., Buscà, B., Solà, J., Peralta-Geis, M., Arboix, A., & Fort-Vanmeerhaeghe, A. (2022). Higher Running Speed and Cardiovascular Endurance Are Associated with Greater Level of Academic Achievement in Urban Catalan Primary School Children. *Sustainability (Switzerland)*, 14(14). <https://doi.org/10.3390/su14148454>
- Asigbee, F. M., Whitney, S. D., & Peterson, C. E. (2018). The Link Between Nutrition and Physical Activity in Increasing Academic Achievement. *Journal of School Health*, 88(6), 407–415. <https://doi.org/10.1111/josh.12625>
- Aziz, I., Okilanda, A., Permadi, A. A., Tjahyanto, T., Prabowo, T. A., Rozi, M. F., Suganda, M. A., & Suryadi, D. (2023). Correlational study: Sports Students' special test results and basic athletic training learning outcomes. *Retos*, 49, 519–524. <https://doi.org/10.47197/retos.v49.98820>
- Aziz, I., Okilanda, A., Rozi, M. F., Suganda, M. A., & Suryadi, D. (2023). Results of Special Tests on Sports Students: Does It Have a Relationship with Learning Outcomes of Basic Athletic Practice? *International Journal of Human Movement and Sports Sciences*, 11(3), 676–682. <https://doi.org/10.13189/saj.2023.110322>
- Bara Crystina L. B. P., Alves Danilo L., de P. Palumbo Diogo, Sotomaior Bruna B, da Silva Leandro, Leitato Marcelo B, & Oisecki Raul. (2019). Changes in the Cardiorespiratory Fitness of Men and Women in Various Age Gr...: USearch @ University College Birmingham. *Journal of Exercise Physiology Online*, 22(1), 1–10.
- Barnett, D. W., Barnett, A., Nathan, A., Van Cauwenberg, J., & Cerin, E. (2017). Built environmental correlates of older adults' total physical activity and walking: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1). <https://doi.org/10.1186/s12966-017-0558-z>
- Bile, R. L., Tapo, Y. B. O., & Desi, A. K. (2021). Pengembangan Model Latihan Kebugaran Jasmani Berbasis Permainan Tradisional Sebagai Aktivitas Belajar Siswa Dalam Pembelajaran PJOK. *Jurnal Penjakora*, 8(1), 71. <https://doi.org/10.23887/penjakora.v8i1.30752>
- Bloemen, M. A., Takken, T., Backx, F. J., Vos, M., Kruitwagen, C. L., & de Groot, J. F. (2017). Validity and Reliability of Skill-Related Fitness Tests for Wheelchair-Using Youth With Spina Bifida. *Archives of Physical Medicine and Rehabilitation*, 98(6), 1097–1103. <https://doi.org/10.1016/j.apmr.2016.08.469>
- Bompa, T. O., & Buzzichelli, C. A. (2019). Periodization: Theory and Methodology of Training. In *Journal of Chemical Information and Modeling*.
- Chabibi Arif, A., Maksum, A., & Kristiyandaru, A. (2021). The Effect of Daily Physical Activity on Increasing Physical Fitness and Academic Achievement of Elementary School. *Budapest International Research and Critics in Linguistics and Education (BirLE) Journal*, 4(2), 964–974. <https://doi.org/10.33258/birle.v4i2.2082>
- Chung, H. R., Meador, B. M., Seo, Y., Kim, K.-O., & Ryu, J.-S. (2021). The Associations Between Physical Fitness, Complex Vs Simple Movement, And Academic Achievement In Elementary School Students. *Medicine & Science in Sports & Exercise*, 53(8S), 263–263. <https://doi.org/10.1249/01.mss.0000762144.59589.0c>
- Corbin, C. B. (2014). *Fitness for Life*. Human Kinetics.
- Cumillaf, A. G., Badilla, P. V., Herrera, C. F., Mora, F. C., Herrera, B. M., Sandoval, E. M., Muñoz, R. G., & Agüero, S. D. (2015). Association between fitness, nutritional status and academic performance in physical education students. *Nutricion Hospitalaria*, 32(4), 1722–1728.
- Damian Puling. (2022). Upaya Meningkatkan Kesegaran Jasmani Melalui Pendekatan Bermain untuk Mengembangkan Karakter Siswa Dalam Pembelajaran Penjas Orkes Di SD Inpres Sikumana 2 Kupang. *Dewantara : Jurnal Pendidikan Sosial Humaniora*, 1(3), 78–90.
- de Almeida Santana, C. C., de Barros, M. V. G., de Medeiros, F. R. C., Rangel Júnior, J. F. L. B., Cantieri, F. P., Alarcon, D., & do Prado, W. L. (2023). Does Physical Fitness Relate to Academic Achievement in High School Students? *Journal of Physical Activity and Health*, 20(1), 1018–1026. <https://doi.org/10.1123/jpah.2022-0534>
- De Almeida Santana, C. C., Farah, B. Q., De Azevedo, L. B., Hill, J. O., Gunnarsdottir, T., Botero, J. P., Do Prado, E. C., & Do Prado, W. L. (2017). Associations between cardiorespiratory fitness and overweight with academic performance in 12-year-old Brazilian children. *Pediatric Exercise Science*, 29(2), 220–227. <https://doi.org/10.1123/pes.2016-0048>
- Gima, H., & Seki, K. (2019). A longitudinal study of the association between physical fitness and academic achievement in school-age children. *Rigakuryoho Kagaku*, 34(1), 119–124. <https://doi.org/10.1589/rika.34.119>
- Hafsah, T., Uyun, N., & Farenia, R. (2018). Correlation between Physical Fitness Components and Academic Achievement in Elementary School Students. *Althea Medical Journal*, 5(3), 146–148. <https://doi.org/10.15850/amj.v5n3.520>
- Han, G.-S. (2018). The relationship between physical fitness and academic achievement among adolescent in South Korea. *Journal of Physical Therapy Science*, 30(4), 605–608. <https://doi.org/10.1589/jpts.30.605>
- Hardinata, R., Rinto, R., Deski, D., Hartikasari, H.,

- Nofita, T., Hendra, H., Pardi, P., & Cadiente, D. S. A. (2024). Physical fitness analysis of elementary school students: a study to design an exercise program. *Tanjungpura Journal of Coaching Research*, 2(1), 13–22. <https://doi.org/10.26418/tajor.v2i1.76118>
- Harianto, E., Gustian, U., Supriatna, E., Shalaby, M. N., & Tair, R. (2023). Stimulating game performance skills in students: experimental studies using net games. *Tanjungpura Journal of Coaching Research*, 1(2), 63–70. <https://doi.org/10.26418/tajor.v1i2.65009>
- Hidayat, H., Hendrayana, Y., Paramitha, S. T., & Permadi, A. A. (2020). EVALUASI PEMBELAJARAN PENJAS (ANALISIS KETERLAKSANAAN PEMBELAJARAN RENANG DI MTs SEKECAMATAN LELES KABUPATEN GARUT). *Multilateral Jurnal Pendidikan Jasmani Dan Olahraga*, 19(2), 103. <https://doi.org/10.20527/multilateral.v19i2.8463>
- Hidayat, R. A., Budiana, D., & Situmorang, A. S. (2020). Pengaruh Low Organized Games terhadap Derajat Kebugaran Jasmani Siswa Sekolah Dasar. *Journal of Teaching Physical Education in Elementary School*, 3(2), 12–19.
- Hoeger, W. W., & Hoeger, S. A. (2018). *Fitness and Wellness*. Cengage Learning Custom.
- Howley, E. T., & Franks, B. D. (2019). *Health Fitness Instructor's Handbook*. Human Kinetics.
- Hsieh, S. S., Tsai, J. R., Chang, S. H., Cheng, C. F., Sung, Y. T., & Hung, T. M. (2018). The Relations between 3-year Changes in Physical Fitness and Academic Performance in Nationally Representative Sample of Junior High School Students. *Scientific Reports*, 8(1). <https://doi.org/10.1038/s41598-018-34370-2>
- Indrayana, B., & Yuliawan, E. (2019). Penyuluhan pentingnya peningkatan Vo2max guna meningkatkan kondisi fisik pemain sepakbola fortuna fc kecamatan rantau rasau. *Jurnal Ilmiah Sport Coaching and Education*, 3(1), 41–50. <https://doi.org/10.21009/jsce.03105>
- Islamin, N. S., Nasution, N. S., & Alfrinaldi, R. (2022). Penjas Materi Lompat Kangkang Senam Lantai Berbasis Online Pada Masa Pandemi Covid-19. *Jurnal Pendidikan Olahraga*, 11(1), 94–103.
- Ismail, E., Razak, M. R. A., Alam, N. A. M., & Bakar, A. Y. A. (2020). The relationship of physical fitness and academic achievement of urban school students in Malaysia. *Universal Journal of Educational Research*, 8(10), 4723–4727. <https://doi.org/10.13189/ujer.2020.081042>
- Jeng, S. C., Chang, C. W., Liu, W. Y., Hou, Y. J., & Lin, Y. H. (2017). Exercise training on skill-related physical fitness in adolescents with intellectual disability: A systematic review and meta-analysis. *Disability and Health Journal*, 10(2), 198–206. <https://doi.org/10.1016/j.dhjo.2016.12.003>
- Juni Samodra, Y. T., Yosika, G. F., Gustian, U., Mashud, M., Arifin, S., Suryadi, D., Wati, I. D. P., Syam, A., Candra, A. R. D., Wati, M. G., & Candra, A. T. (2024). Are boys and girls in rural areas equal in terms of gross motor skills? *Retos*, 54, 94–99. <https://doi.org/10.47197/retos.v54.103005>
- Peraturan Menteri Agama Nomor 90 Tahun 2013 tentang Penyelenggaraan Pendidikan Madrasah, 1 (2013).
- Khairuddin. (2014). The influence of modified games and conventional learning models on the physical fitness of junior high school students. *Asian Social Science*, 10(5), 136–140. <https://doi.org/10.5539/ass.v10n5p136>
- Khairuddin, Masrun, Baktiar, S., & Syahrudin. (2023). Analysis of the impact of game-based physical education learning on physical fitness of junior high school students. *Cakrawala Pendidikan*, 42(1), 241–253. <https://doi.org/10.21831/cp.v42i1.54605>
- Kokkinos, P. (2010). *Physical Activity and Cardiovascular Disease Prevention*. Jones & Bartlett Learning.
- Kulp, A. J., & Zhu, X. (2021). Before School Exercise Effects on Fitness and Academic Performance in Schoolchildren: A Retrospective Case-Controlled Study. *Journal of Teaching in Physical Education*, 1–6. <https://doi.org/10.1123/jtpe.2021-0058>
- Kusuma, I. K. H. W., Asmawi, M., Hernawan, H., Dlis, F., Widiastuti, W., & Kanca, I. N. (2021). A Study of Learning Physical Fitness Activities Based on Traditional Balinese Sports Games for Students' Physical Fitness. *International Journal of Human Movement and Sports Sciences*. <https://doi.org/10.13189/saj.2021.090525>
- Kyan, A., Takakura, M., & Miyagi, M. (2018). Does physical fitness affect academic achievement among Japanese adolescents? A hybrid approach for decomposing within-person and between-persons effects. *International Journal of Environmental Research and Public Health*, 15(9). <https://doi.org/10.3390/ijerph15091901>
- Kyan, A., Takakura, M., & Miyagi, M. (2019). Mediating effect of aerobic fitness on the association between physical activity and academic achievement among adolescents: A cross-sectional study in Okinawa, Japan. *Journal of Sports Sciences*, 37(11), 1242–1249. <https://doi.org/10.1080/02640414.2018.1554552>
- Lambert, A., Vlaar, J., Herrington, S., & Brussoni, M. (2019). What is the relationship between the neighbourhood built environment and time spent in outdoor play? A systematic review. *International Journal of Environmental Research and Public Health*, 16(20). <https://doi.org/10.3390/ijerph16203840>
- Latino, F., Fischetti, F., Cataldi, S., Monacis, D., & Colella, D. (2021). The impact of an 8-weeks at-home physical activity plan on academic achievement at the time of covid-19 lock-down in italian school. *Sustainability (Switzerland)*, 13(11). <https://doi.org/10.3390/su13115812>
- Lestari, D. F. (2021). Pengembangan Model Pembelajaran Aktivitas Jasmani Melalui Permainan Tradisional Bagi Siswa Sekolah Dasar. *Jurnal Pendidikan Jasmani, Olahraga Dan Kesehatan Undiksha*, 8(1), 7. <https://doi.org/10.23887/jjp.v8i1.33742>
- Li, L., & Zhang, L. (2022). The Relationship between

- Physical Activity and Academic Achievement in Multimodal Environment Using Computational Analysis. *Computational Intelligence and Neuroscience*, 2022. <https://doi.org/10.1155/2022/9418004>
- Liguori, G., & Medicine, A. C. (2017). *ACSM's Guidelines for Exercise Testing and Prescription*. Wolters Kluwer Lippincott Williams & Wilkins Health.
- Lo, K. Y., Wu, M. C., Tung, S. C., Hsieh, C. C., Yao, H. H., & Ho, C. C. (2017). Association of school environment and after-school physical activity with health-related physical fitness among junior high school students in Taiwan. *International Journal of Environmental Research and Public Health*, 14(1). <https://doi.org/10.3390/ijerph14010083>
- Lu, Z., Li, Z., Mao, C., Tan, Y., Zhang, X., Zhang, L., Zhu, W., & Sun, Y. (2022). Correlation between Campus-Built Environment and Physical Fitness in College Students in Xi'an—A GIS Approach. *International Journal of Environmental Research and Public Health*, 19(13). <https://doi.org/10.3390/ijerph19137948>
- Lubis, J. (2018). *Pembinaan kebugaran jasmani dan pemulihan*. Rajawali Pers.
- Ma'ruf, R. S. (2019). *PENGEMBANGAN MODIFIKASI PERMAINAN TRADISIONAL BERNILAI ISLAMI DALAM MATA PELAJARAN PENDIDIKAN JASMANI PESERTA DIDIK KELAS ATAS SEKOLAH DASAR ISLAM TERPADU AL-FALAH KOTA SUKABUMI 2019/2020*.
- Mashud, M., Arifin, S., Warni, H., Samodra, Y. T. J., Yosika, G. F., Basuki, S., Suryadi, D., & Suyudi, I. (2024). Physical Fitness: Effects of active lifestyle internalization through physical literacy awareness based project. *Retos*, 51, 1299–1308. <https://doi.org/10.47197/retos.v51.101662>
- Mashud, Warni, H., Putra, M. F. P., Haris, M. Al, Samodra, Y. T. J., Tantri, A., Kristiyandaru, A., & Suryadi, D. (2023). Integrating the Project-Based Learning and the Inclusive Teaching Style: An Innovation to Improve Freestyle Swimming Skills. *International Journal of Human Movement and Sports Sciences*, 11(5), 956–964. <https://doi.org/10.13189/saj.2023.110503>
- Matejek, Č., & Planinšec, J. (2022). The Relationship between Academic Achievement and Physical Fitness in Preadolescent Children. *Croatian Journal of Education*, 24(1), 97–126. <https://doi.org/10.15516/cje.v24i1.4231>
- McCormack, G. R. (2017). Neighbourhood built environment characteristics associated with different types of physical activity in Canadian adults. *Health Promotion and Chronic Disease Prevention in Canada*, 37(6), 175–185. <https://doi.org/10.24095/hpcdp.37.6.01>
- Morita, N., Nakajima, T., Okita, K., Ishihara, T., Sagawa, M., & Yamatsu, K. (2016). Relationships among fitness, obesity, screen time and academic achievement in Japanese adolescents. *Physiology and Behavior*, 163, 161–166. <https://doi.org/10.1016/j.physbeh.2016.04.055>
- Murtono, T., Kungku, C., & Sukrawan, N. (2022). Analisis tingkat kebugaran jasmani Indonesia di SMP Negeri 2 Parigi Selatan dan MTs Al-Khairat Parigi Selatan Selatan. *Tadulako Journal Sport Sciences and Physical Education Volume*, 10(1), 34–39.
- Nabilah, R. D., & Ardyanto, Y. D. (2020). Physical Fitness Factor Analysis on Employees at the Fertilizer Company. *The Indonesian Journal Of Occupational Safety and Health*, 9(3), 297. <https://doi.org/10.20473/ijosh.v9i3.2020.297-308>
- Nordbø, E. C. A., Raanaas, R. K., Nordh, H., & Aadodt, G. (2019). Neighborhood green spaces, facilities and population density as predictors of activity participation among 8-year-olds: a cross-sectional GIS study based on the Norwegian mother and child cohort study. *BMC Public Health*, 19(1), 1426. <https://doi.org/10.1186/s12889-019-7795-9>
- Oreskovic, N. M., Perrin, J. M., Robinson, A. I., Locascio, J. J., Blossom, J., Chen, M. L., Winickoff, J. P., Field, A. E., Green, C., & Goodman, E. (2015). Adolescents' use of the built environment for physical activity. *BMC Public Health*, 15(1). <https://doi.org/10.1186/s12889-015-1596-6>
- Pan, D., Zhong, B., Guo, W., & Xu, Y. (2022). Physical fitness characteristics and performance in single-handed dinghy and 470 classes sailors. In *Journal of Exercise Science and Fitness* (Vol. 20, Issue 1, pp. 9–15). Elsevier. <https://doi.org/10.1016/j.jesf.2021.11.001>
- 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>
- Prince, S. A., Lancione, S., Lang, J. J., Amankwah, N., de Groh, M., Jaramillo Garcia, A., Merucci, K., & Geneau, R. (2022). Examining the state, quality and strength of the evidence in the research on built environments and physical activity among children and youth: An overview of reviews from high income countries. *Health and Place*, 76. <https://doi.org/10.1016/j.healthplace.2022.102828>
- Putri, R. A. (2019). Pengembangan Model Pembelajaran Aktifitas Jasmani Untuk Membentuk Karakter Melalui Kolaboratif Permainan Tradisional Bagi Siswa Sekolah Dasar. *Jurnal Pendidikan Jasmani, Olahraga Dan Kesehatan Undiksha*, 7(3), 126. <https://doi.org/10.23887/jjp.v7i3.36490>
- Rizqika Rizal, D. H., Subekti, N., & Alzaid, M. T. (2022). Physical Fitness Profile of Students in terms of Student Activities in Sports. *Journal of Coaching and Sports Science*, 1(1), 28–33. <https://doi.org/10.58524/jcss.v1i1.111>
- 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>
- Samodra, Y. T. J., Suryadi, D., Wati, I. D. P., Supriatna, E., Santika, I. G. P. N. A., Suganda, M. A., & Dewi, P. C. P. (2023). Analysis of gross motoric analysis of elementary school students: A comparative study of students in hill and coastal areas. *Pedagogy of Physical Culture and Sports*, 27(2), 139–145. <https://doi.org/10.15561/26649837.2023.0206>
- Sardinha, L. B., Marques, A., Martins, S., Palmeira, A., & Minderico, C. (2014). Fitness, fatness, and academic performance in seventh-grade elementary school students. *BMC Pediatrics*, 14(1). <https://doi.org/10.1186/1471-2431-14-176>
- Sato, K., Maeda, H., Maeda, K., Tanaka, N., & Akima, H. (2021). Relationship between physical activity and physical fitness, skeletal muscle mass and muscle quality in junior high school students. *Japanese Journal of Physical Fitness and Sports Medicine*, 70(6), 383–394. <https://doi.org/10.7600/JSPFSM.70.383>
- 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>
- Shaw, S. R., Gomes, P., Polotskaia, A., & Jankowska, A. M. (2015). The relationship between student health and academic performance: Implications for school psychologists. *School Psychology International*, 36(2), 115–134. <https://doi.org/10.1177/0143034314565425>
- Shih, C.-P. (2016). Factors Associated with Health-Related Physical Fitness among Junior High School Students in Taiwan. *Sports & Exercise Research*, 18(1), 56–65. <https://doi.org/10.5297/ser.1801.005>
- Siedentop, D., & Mars, H. Van Der. (2012). *Introduction to Physical Education, Fitness & Sport Eighth Edition*. McGraw Hill Education.
- Sitompul, S. R., & Sholihamia, A. (2020). Modifikasi Gerak Dasar Melalui Terapan Pole Circuit Games Dalam Upaya Meningkatkan Kebugaran Jasmani Siswa. *Jurnal Penjaskesrek*, 7(2), 262.
- Suratmin, S., Darmayasa, I. P., Gozali, W., Hanif, Q. A., Samodra, Y. T. J., Wati, I. D. P., Suryadi, D., Kushartanti, B. M. W., & Fauziah, E. (2024). Assessment of sports coaching patterns, physical abilities, and physical fitness in athletics: a study of the provincial sports week championship. *Retos*, 51, 1404–1414. <https://doi.org/10.47197/retos.v51.101943>
- Suryadi, D., Komaini, A., Suganda, M. A., Rubiyatno, R., Faridah, E., Fauzan, L. A., Fauziah, E., Putra, M. E., & Ayubi, N. (2024). Sports Health in Older Age: Prevalence and Risk Factors - Systematic Review. *Retos*, 53, 390–399. <https://doi.org/10.47197/retos.v53.102654>
- Suryadi, D., Nasrulloh, A., Haryanto, J., Samodra, Y. T. J., Wati, I. D. P., Suganda, M. A., Nugroho, S., Dafun Jr, P. B., Kushartanti, B. M. W., & Fauziah, E. (2024). What are physical exercise interventions in older age? Literature review for physical and cognitive function. *Pedagogy of Physical Culture and Sports*, 28(3 SE-Articles), 201–212. <https://sportpedagogy.org.ua/index.php/ppcs/article/view/2657>
- Suryadi, D., Nasrulloh, A., Yanti, N., Ramli, R., Fauzan, L. A., Kushartanti, B. W., Sumaryanti, S., Suhartini, B., Budayati, E. S., Arovah, N. I., Mashud, M., Suganda, M. A., Sumaryanto, S., Sutapa, P., Abdullah, N. M. bin, & Fauziah, E. (2024). Stimulation of motor skills through game models in early childhood and elementary school students: systematic review in Indonesia. *Retos*, 51, 1255–1261. <https://doi.org/10.47197/retos.v51.101743>
- Suryadi, D., Okilanda, A., Nofrizal, D., Anggara Suganda, M., Tulyakul, S., Ahmed, M., Hussain, I., Nasrulloh, A., Juni Samodra, Y. T., Puspita Wati, I. D., & Herdiyana Bastian, R. (2024). How does cooperative learning work with students? Literature review in physical education. *Retos*, 55, 527–535. <https://doi.org/10.47197/retos.v55.105256>
- Suryadi, D., Suganda, M. A., Sacko, M., Samodra, Y. T. J., Rubiyatno, R., Supriatna, E., Wati, I. D. P., & Okilanda, A. (2023). Comparative Analysis of Soccer and Futsal Extracurriculars: A Survey Study of Physical Fitness Profiles. *Physical Education and Sports: Studies and Research*, 2(1), 59–71. <https://doi.org/10.56003/pessr.v2i1.182>
- Suryadi, D., Susanto, N., Faridah, E., Wahidi, R., Samodra, Y. T. J., Nasrulloh, A., Suganda, M. A., Wati, I. D. P., Sinulingga, A., Arovah, N. I., & Dewantara, J. (2024). Exercise for health in old age: Comprehensive review examining the benefits and efficacy of interventions. *Retos*, 55(SE-Revisiónes teóricas, sistemáticas y/o metaanálisis), 88–98. <https://doi.org/10.47197/retos.v55.103771>
- Susilawati, I., & Nur Moh Kusuma Atmaja. (2023). Model Pembelajaran Pendidikan Jasmani Melalui Permainan Sirkuit Untuk Pembentukan Karakter Siswa Sekolah Kelas Atas. *Jurnal Pendidikan Jasmani Kesehatan Dan Rekreasi (Penjaskesrek)*, 10(1), 38–47.
- Takehara, K., Togoobaatar, G., Kikuchi, A., Lkhagvasuren, G., Lkhagvasuren, A., Aoki, A., Fukuie, T., Shagdar, B. E., Suwabe, K., Mikami, M., Mori, R., & Soya, H. (2021). Exercise intervention for academic achievement among children: A randomized controlled trial. *Pediatrics*, 148(5). <https://doi.org/10.1542/peds.2021-052808>
- Tanineh, W., & Halaweh, H. (2023). Cardiorespiratory Fitness, Motor Coordination, and Academic Achievement in School Students (11-13 years). *Global*

- Pediatric Health*, 10. <https://doi.org/10.1177/2333794X231207311>
- Tanri, A., Aprial, M. B., Mashud, M., Kristyandaru, A., Kahri, M., Basuki, S., Samodra, Y. T. J., Warni, H., Arifin, S., Puspita Wati, I. D., Thamrin, L., & Suryadi, D. (2023). Modificación de multimedia interactivo con el ARA MODELO: estudio del desarrollo de modelos de aprendizaje del fútbol en tiempos de pandemia (Modification of interactive multimedia with the ARA MODEL: study of development of football learning models in pandemic times). *Retos*, 50(SE-Artículos de carácter científico: trabajos de investigaciones básicas y/o aplicadas), 1289–1298. <https://doi.org/10.47197/retos.v50.100587>
- Taopiqurohman, Ismaya, B., & Susianti, E. (2022). Problematika Guru Dalam Memodifikasi Media Pembelajaran Pendidikan Jasmani Di Mts Ghoyatul Jihad Karawang. *Jspeed*, 05(01), 79–90.
- Ushijima, K., Watanabe, H., & Shimura, M. (2016). The relationships among physical fitness, academic achievements, psychological stress scale scores and lifestyles of junior high school students. *Japan Journal of Human Growth and Development Research*, 2016(72), 19–30. https://doi.org/10.5332/hatsuhatsu.2016.72_19
- 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>
- Waluyo, W. (2023). The Effect of low impact aerobic gymnastics on improving physical fitness in students. *Jurnal SPORTIF: Jurnal Penelitian Pembelajaran*, 9(2), 185–197. https://doi.org/10.29407/js_unpgri.v9i2.19982
- Weemer, M. M., & Ayodele, O. (2021). Associations of Physical Fitness and Academic Achievement Among Illinois High School Students. *The Physical Educator*, 78(3). <https://doi.org/10.18666/tpe-2021-v78-i3-10311>
- Widiastuti. (2011). Tes dan Pengukuran Olahraga. In *Jakarta: Rajawali Pers*.
- Yanti, N., Susanto, N., Putra Sastaman, B., Suryadi, D., Suganda, M. A., Kuswoyo, D. D., & Nasrulloh, A. (2024). Application of plyometric training in handball games: How effective is it on throwing power and speed? *Journal of Physical Education and Sport*, 24(5), 1183–1190. <https://doi.org/10.7752/jpes.2024.05136>

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