Journal of Physical Education and Sport ® (JPES), Vol. 23 (issue 12), Art 387, pp. 3378- 3384, December 2023
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Physical fitness levels of junior high school students in different regions: Highlands, lowlands, and islands

BERTO APRIYANO[1], ZAINAL ABIDIN ZAINUDDIN[2], ASHA HASNIMY MOHD HASHIM[3], SAMEER MOHAMMED SAYYD[4], ADJAH NAQKIAH MAZLAN[5]
[1]Department of Physical Education, Faculty of Sport Science, Universitas Negeri Padang, INDONESIA
[2,3,5]School of Education, Faculty of Social Sciences and Humanities, University Technology Malaysia, MALAYSIA
[4]Department of Physical Education and Sport Science, Faculty of Education, Taibah University, SAUDI ARABIA

Published online: December 31, 2023
(Accepted for publication : December 15, 2023)
DOI:10.7752/jpes.2023.12387

Abstract:
Physical Education is an integral part of the national education program, aiming to develop aspects of physical fitness and aspects of self-skills through the provision of learning experiences that use selected physical and carried out systematically. One of the goals of physical education is to improve physical fitness. This study aims to find out why the low level of physical fitness of students, whether there is an influence with the geographical location of an area, so the purpose of this study was to determine the difference in the level of physical fitness possessed by highland, lowland and island students with diverse geographical conditions in Indonesia. The highlands were in Kerinci district, Jambi, the lowlands were in Padang, West Sumatra, while the islands were in Meranti Islands district, Riau. These three regions were represented by 2 - 3 schools each, which were both located in city and district centers, but differ in terms of geographical categories. This design had a quantitative descriptive research type using comparative analysis. The instrument used was the existing and patented TKJI for ages 13-15 years. The sample used was the students grade VII of Junior High School. The data obtained were then analyzed by using an independent sample t-test with a prerequisite test of normality test and homogeneity test. These findings show that the average value for the highland region was 13.83; lowland areas was 13.20; and islands was 13.26. Meanwhile, based on the test results using ANOVA, the highlands have a better score. Therefore, it can be concluded that the area that has a better level of physical fitness among the three areas is the highlands area (Kerinci Regency, Jambi).
Keywords: **Physical Condition, Highlands, Lowlands, Islands, Students.**

Introduction

Education is one of the most important things for human life. Humans will not be able to escape from educational activities. Because education is an absolute thing that must be fulfilled for every individual, both through the formal and non-formal realms (Zhang et al., 2022). By education, humans can hone their potential, so that humans can change themselves as needed, such as experience, knowledge and skills that can make humans a better person than before. Things like this are often found in schools, because schools are a place to seek knowledge in the formal realm (Raja & Nagasubramani, 2018). At school, individuals are taught various kinds of knowledge, not only knowledge about sharpening brain intelligence, but also taught the science of movement through physical education (Marques et al., 2017).

A form of education that is arranged systematically and directed through learning activities that contain cognitive, affective, and psychomotor elements in order to improve the individual as a whole is the definition of physical fitness (Apriyano et al., 2020; Gray et al., 2015a; Mora-Gonzalez et al., 2019). Through this physical education individuals can develop their potential, especially in the aspect of movement or motor. Because physical education emphasizes the development of movement or motor skills rather than other subjects that focus more on brain intelligence (Raiola, 2017). Motion is also a characteristic of life. As it is known that movement is needed by humans to live their daily lives, such as walking and running. Movement must always be trained. Therefore, physical education teaches about how to develop a good and correct way of moving so that each individual becomes skilled in moving and will have a positive impact on him, namely making the body condition healthy and fit (Potdevin et al., 2018).

Physical Education is an integral part of the national education program, aiming to develop aspects of physical fitness and other aspects of self-skills through the provision of learning experiences using selected physical and carried out systematically. One of the goals of physical education is to improve physical fitness (Firdaus et al., 2023; Muhajir, 2017; Welis et al., 2023).

Corresponding Author: BERTO APRIYANO, E-mail: bertoapriyano@fik.unp.ac.id

Nowadays, technology is developing very rapidly, one of which is the development of games on gadgets. This results in many children playing it, so they prefer to stay at home and play gadgets rather than playing games that utilize movement activities. Playing gadgets is considered more interesting than having to go out and spend energy. However, this will have a negative impact on children's physical fitness. Therefore, physical education is very important in maintaining children's physical fitness. As stated by (Silverman, 2017) entitled "Efforts to Improve Students' Physical Fitness Through PE" states that efforts to improve students' physical fitness can be done through physical education.

According to (Apriyano et al., 2022), “A person who can perform daily physical activities without causing significant fatigue can be said to have good physical fitness". Meanwhile, according to (Cattuzzo et al., 2016), "Physical fitness is the level of dynamic health of a person, which becomes the basic physical ability to perform the tasks that must be done.". Physical fitness must be maintained properly through regular sports activities and other thing because someone who feels healthy does not necessarily have good physical fitness. Therefore, it should not be ignored so that our bodies are always ready to carry out daily activities. So that we can be maximized in doing work and get good results.

The level of physical fitness of each student is not the same as one another. The difference is due to the different lifestyles of each individual (Cairney et al., 2019). If the student maintains a good lifestyle such as eating nutritious food, getting enough rest, and exercising regularly, then his physical fitness will be good. These three things can affect the condition of students' physical fitness. This physical fitness must be considered properly, especially at the growth stage. This growth stage occurs in students who are in junior high school (SMP) (Beni et al., 2017).

Junior high school is one of the formal education levels in Indonesia. Students who are studying at the junior high school level have an average age of 13-15 years because at this age the growth period is very good. Body conditions must be maintained properly so that the growth of students goes well. One of the things that supports the growth of students is to maintain physical fitness so that it is always good. Because with good physical fitness will spur growth, including increasing height and weight harmoniously (Siedentop & Van der Mars, 2022).

Kerinci Regency, Jambi is one of the highland areas in Indonesia, especially on the island of Sumatra. The Kerinci Regency area stretches from Gunung Tujuh to Gunung Raya, most of which (98%) is at an altitude above 500 m - 3,805 m above sea level and is part of the Bukit Barisan. The undulating and hilly character of the area forming a very wide enclave and partly covered with natural dense forest is a characteristic of the district area that is different from other regions in general. The topography, which is a hilly plateau surrounded by mountains and dense forests, causes this regency to have a cool and comfortable climate (dari Gustya, 2020). For Kerinci district, Jambi will be used as a sample, namely SMP N 1 Kerinci, SMP N 19 Kerinci and SMP N 22 Kerinci..

Padang City, West Sumatra is one of the low-lying areas in Indonesia, especially the island of Sumatra. Padang which stretches from north to south has 68.126 km of beaches and there is a row of Bukit Barisan with a length of hill area (including rivers) 486.209 Km2. The combination of the two locations makes Padang City has a very beautiful and attractive nature (Statistik, 2020). The height of the land area of Padang City varies greatly, which is between 0 - 1853 m above sea level with the highest area being Lubuk Kilangan District. For the city of Padang, West Sumatra will be used as a sample, namely SMP N 14 Padang, SMP N 24 Padang.

Meranti Islands Regency, Riau is geographically located between approximately 0° 42' 30" - 1° 28' 0" N, and 102° 12' 0" E. - 103° 10' 0" East, and is located on the eastern coast of the island of Sumatra, with a coastline that borders a number of neighboring countries. Based on the results of the interpretation of topographic maps with a scale of 1:250,000, a general picture is obtained that the Meranti Islands Regency area is mostly flat topography with a slope of 0-8%, with an average altitude of around 1-6.4 m above sea level (Hidayat & Darwin, 2017). For the Meranti Islands district, Riau will be used as a sample, namely SMP N 1 Tebing Tinggi, SMP N 1 Tebing Tinggi Barat and MTs Mu'allimin Selat Panjang.

The environment of students related to their geographical location is very diverse. This is because the area is in an uneven area, of course the activities of each student in the highlands, lowlands and islands are also different. In reality in the field, children in the highlands have more activities, because the demands of uneven terrain, full of roads that go up and down hills will force students to travel on foot every day to school. In addition, these conditions certainly cannot be reached by means of transportation to get to school (Gray et al., 2015b). For this reason, a good physical fitness condition is needed from the start of going to school to returning home. Good physical fitness is an absolute must-have for every student. A fit person is a person who has a healthy outlook, is bright towards his life, both for the present and the future and has good social interaction with the surrounding environment (Nugraha, 2015).

In addition, the role of teachers is also very important in the process of student growth and development at school, including teachers must know the level of physical fitness of their students, because most PE teachers do not know how much their students' physical fitness level is. By the PE teacher knowing the level of physical fitness of his students, they can determine what learning is suitable for the fitness conditions of his students.

Based on this description, the researchers considered that it is necessary to conduct a research on the level of physical fitness of students in highland areas, students in lowland areas, and students in island areas. In addition, PE teachers can also find out the fitness level of their students because so far there has never been a physical fitness test for their students.

Materials & Methods

The research used in this study was descriptive quantitative research with the understanding that research has the aim of obtaining a real picture of an object that is supported by obtaining data in the form of numbers from the results of a test (Sugiyono, 2016).

This research used a survey method (Kadir & Pd, 2015; Kesumawati et al., 2017). The object was physical fitness and as the subject was junior high school students grade VIII in the highlands, lowlands and islands. The instrument used in this research was the Indonesian Physical Fitness Test (TKJI) age 13-15 years. (Wayangakau & Loupatty, 2022).

The subjects in this study were some VIII grade students in the highland area (SMP N 1 Kerinci, SMP N 19 Kerinci and SMP N 22 Kerinci), lowland area (SMP N 14 Padang, SMP N 24 Padang) and for the archipelago (SMP N 1 Tebing Tinggi, SMP N 1 Tebing Tinggi Barat and MTs Mu'allimin Selat Panjang). The representative sample for each region amounted to 50 students, so the total sample for the entire region was 150 students.

Table 1. Number of Samples for All Regions

No	Regional	Boys	Girls
1	Highlands (Kerinci Regency, Jambi)	31	19
2	Lowlands (Padang City, West Sumatra)	21	29
3	Islands (Meranti Islands Regency, Riau)	23	27
Total		75	75

The physical fitness test for ages 13-15 years consists=ed of running 50 meters, hanging body lift (pull up) for 60 seconds, lying down (sit up) for 60 seconds, jumping upright (vertical jump), running 1000 meters (boys) and running 800 meters (girls). After doing the test, it was analyzed with the following steps, (1) The results of each test item that has been achieved by the participant can be referred to as a rough result, (2) The rough results differred from one test item to another, which included time units, motion repetitions, and height measurements. And must be converted into the same unit in the form of a value, (3) If it was in the form of a value, then the units were the same and can be added up. Sum up all the test items, (4) The number of values was used for the basis for determining the classification of participants' physical fitness according to the TKJI Table. To calculate the difference in physical fitness of VIII grade students between highlands, lowlands and islands, the researchers used descriptive analysis.

Results

The results of the research in the form of descriptive statistics were shown for each type of test. Then, they were shown in tabular form which includes percentage data.

To clarify the percentage, it was converted in the form of a Pie diagram. After that it was described according to the results listed in the Table. From the distribution, it was known what classification is more dominant in each school. In addition to the dominant classification, the average score of each school was also shown, showing the comparison between the three regions.

Table 2. Physical Fitness Test Results of Class VIII All Region

No	Total Value	Classification	Total TKJI TEST Score	Percentage
1	22 – 25	Excellent (BS)	2	1,33 %
2	18 – 21	Good (B)	21	14 %
3	14 – 17	Medium (S)	68	45,33 %
4	10 – 13	Less (K)	58	38,67 %
5	5 – 9	Very Poor (KS)	1	0,67 %

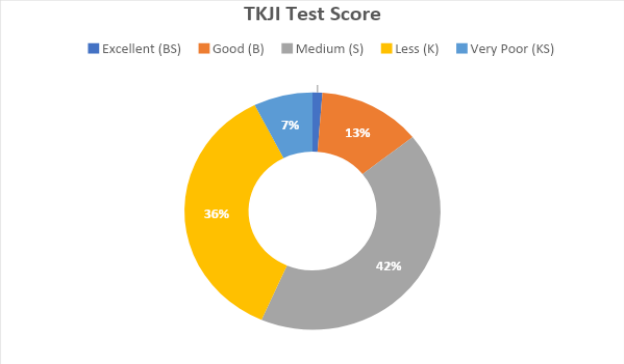

Figure 1. Pie Chart of Physical Fitness Level of Class VIII Students in all region

Comparative Analysis

Comparison of Physical Fitness Test Results of VII Grade Students in Highlands, Lowlands and Islands.

Table 3. Descriptive TKJI Data from Highland, Lowland and Islands Regions

Descriptives

KEBUGARAN JASMANI									
						95% Confidence Interval for Mean			
		N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum	Between-Component Variance
Dataran Tinggi (Highland)		50	15,76	3,566	0,504	14,75	16,77	8	22	
Dataran Rendah (Lowland)		50	13,72	1,852	0,262	13,19	14,25	8	19	
Kepulauan (Island)		50	13,50	2,794	0,395	12,71	14,29	5	19	
Total		150	14,33	2,967	0,244	13,84	14,81	5	22	
Model	Fixed Effects				2,828	0,231	13,87	14,78		
	Random Effects					0,719	11,23	17,42		1,393

Based on the Table above, it shows that based on the average value, the highlands have an average value of 16,26, the lowlands have an average value of 13.72 and the islands have an average value of 13.82. Therefore, it can be concluded that the area that has a better physical fitness level among the three regions is the Highlands (Kab. Kerinci, Jambi).

Table 4. Test of Normality Data

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
DAERAH		Statistic	df	Sig.	Statistic	df	Sig.
KEBUGARAN JASMANI	Dataran Tinggi (Highland)	0,098	50	,200*	0,956	50	0,060
	Dataran Rendah (Lowland)	0,120	50	0,069	0,956	50	0,060
	Kepulauan (Island)	0,116	50	0,092	0,959	50	0,085

Table 5. Test of Homogeneity of Variances Data

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
KEBUGARAN JASMANI	Based on Mean	7,791	2	147	0,001
	Based on Median	7,663	2	147	0,001
	Based on Median and with adjusted df	7,663	2	125,169	0,001
	Based on trimmed mean	7,638	2	147	0,001

Table 6. Test of ANOVA

ANOVA							
KEBUGARAN JASMANI							
			Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)		155,293	2	77,647	9,725	0,000
	Linear Term	Contrast	127,690	1	127,690	15,993	0,000
		Deviation	27,603	1	27,603	3,457	0,065
Within Groups			1173,700	147	7,984		
Total			1328,993	148			

Discussion

Based on the results of descriptive analysis there was a difference between the level of physical fitness of students grade VIII between the highlands, lowlands and islands. The average values of the highland area were 13.83, the lowlands were 13.20 and the islands were 13.26. So that the order based on the average value is Highlands, Islands, Lowlands. However, the difference in average values found was not too significant.

Of course, this difference in altitude will also result in environmental differences that can affect health. This is similar to research conducted by (Cooper et al., 2015) which says that there is a significant difference in the level of physical fitness between students who are in the highlands and students who are in coastal areas. According to.

The level of physical fitness of the highland group was slightly better than the lowland group, but there was no significant difference between the two groups. (Kolokoltsev, Ambartsumyan, Vyazovichenko, et al., 2023). (Vala et al., 2022) stated that aspects of the natural environment which include temperature, humidity and altitude can affect a person's fitness.

The second aspect is that facilities and infrastructure also affect student fitness. (Althoff et al., 2017) said that the lack of field facilities at school is one of the obstacles in learning physical education which results in less effective learning. There are several factors that affect the level of physical fitness including 1) Frequency of Exercise, 2) Facilities and Infrastructure, 3) Knowledge and 4) Nutrition (Kolokoltsev, Ambartsumyan, Romanova, et al., 2023).

Physical fitness is very important for everyone to have. Especially in junior high school, it is needed in its growth period. Everyone has the right to improve individual physical fitness abilities, from less to moderate, from moderate to good den so on. Because if the student's physical fitness level is good, it will also have an impact on the student's academics. With good fitness students will receive lessons well. Achievement will also improve, the level of concentration of students will increase and will bring up innovative and creative ideas (Fühner et al., 2021).

Conclusions

Based on the results of the study, the researchers provide recommendations: (1) It is expected that teachers and schools pay attention to the level of physical fitness of their students, so that students get a better level of physical fitness by holding programs that can improve students' physical fitness, (3) It is expected that students are motivated by the importance of maintaining physical fitness and can improve their physical fitness even better. So that students can do activities and carry out school assignments with enthusiasm and do not give up easily because they have a fit condition.

Based on the results of the study, the following conclusions can be drawn: 1) The level of physical fitness of students grade VIII conducted in the Highlands area (Kerinci Regency, Jambi) carried out at SMP N 1 Kerinci, SMP N 19 Kerinci and SMP N 22 Kerinci obtained an average value of 13.83, with a dominant classification with an assessment of less than 52%, meaning it was classified as weak, 2) The level of physical fitness of students grade VIII conducted in the Lowland area (Padang, West Sumatra) carried out at SMP N 14 Padang and SMP N 24 Padang obtained an average value of 13.20, with a dominant classification with an assessment of less than 50%, meaning it is classified as weak, 3)

The level of physical fitness of class VIII students conducted in the Islands area (Meranti Island Regency, Riau) which was carried out at SMP N 1 Tebing Tinggi, SMP N 1 Tebing Tinggi Barat and MTs Mu'allimin Selat Panjang obtained an average value of 13.26, with a dominant classification with an assessment of less than 56%, meaning it was classified as weak. 4) Based on these results although it does not have a significant difference through the average value of the TKJI score. However, it can be concluded from the three regions that the Highlands Region (Kerinci Regency, Jambi) has a better average value than the Islands Region (Meranti Island Regency, Riau) in second place, and the Lowland Region (Padang, West Sumatra) in third place.

References

Althoff, T., Sosič, R., Hicks, J. L., King, A. C., Delp, S. L., & Leskovec, J. (2017). Large-scale physical activity data reveal worldwide activity inequality. *Nature*, *547*(7663), 336–339.

Apriyano, B., Zainuddin, Z. A., & Hashim, A. H. M. (2020). Physical fitness of student at the junior high school. *1st International Conference of Physical Education (ICPE 2019)*, 105–110.

Apriyano, B., Zainuddin, Z. A., & Hashim, A. H. M. (2022). Physical activity module in health sports physical education learning on physical fitness and health. *International Journal of Human Movement and Sports Sciences*, *10*(4). https://doi.org/10.13189/saj.2022.100412

Beni, S., Fletcher, T., & Ní Chróinín, D. (2017). Meaningful experiences in physical education and youth sport: A review of the literature. *Quest*, *69*(3), 291–312.

Cairney, J., Dudley, D., Kwan, M., Bulten, R., & Kriellaars, D. (2019). Physical literacy, physical activity and health: Toward an evidence-informed conceptual model. *Sports Medicine*, *49*, 371–383.

Cattuzzo, M. T., dos Santos Henrique, R., Ré, A. H. N., de Oliveira, I. S., Melo, B. M., de Sousa Moura, M., de Araújo, R. C., & Stodden, D. (2016). Motor competence and health related physical fitness in youth: A systematic review. *Journal of Science and Medicine in Sport*, *19*(2), 123–129.

Cooper, A. R., Goodman, A., Page, A. S., Sherar, L. B., Esliger, D. W., van Sluijs, E. M. F., Andersen, L. B., Anderssen, S., Cardon, G., & Davey, R. (2015). Objectively measured physical activity and sedentary time in youth: the international children's accelerometry database (ICAD). *International Journal of Behavioral Nutrition and Physical Activity*, *12*(1), 1–10.

dari Gustya, W. (2020). Analisis perkembangan sektor pariwisata di kabupaten kerinci. *Jurnal Teori Dan Riset Administrasi Publik*, *4*(2), 49–54.

Firdaus, K., Hartoto, S., Hariyanto, A., Subagya, I., Nikmatullaili, Mario, D. T., & Zulbahri. (2023). Evaluation of several factors that affect the learning outcomes of Physical Education. *International Journal of Human Movement and Sports Sciences*, *11*(1), 27–36. https://doi.org/10.13189/saj.2023.110104

Fühner, T., Kliegl, R., Arntz, F., Kriemler, S., & Granacher, U. (2021). An update on secular trends in physical fitness of children and adolescents from 1972 to 2015: a systematic review. *Sports Medicine*, *51*, 303–320.

Gray, C., Gibbons, R., Larouche, R., Sandseter, E. B. H., Bienenstock, A., Brussoni, M., Chabot, G., Herrington, S., Janssen, I., & Pickett, W. (2015a). What is the relationship between outdoor time and physical activity, sedentary behaviour, and physical fitness in children? A systematic review. *International Journal of Environmental Research and Public Health*, *12*(6), 6455–6474.

Gray, C., Gibbons, R., Larouche, R., Sandseter, E. B. H., Bienenstock, A., Brussoni, M., Chabot, G., Herrington, S., Janssen, I., & Pickett, W. (2015b). What is the relationship between outdoor time and physical activity, sedentary behaviour, and physical fitness in children? A systematic review. *International Journal of Environmental Research and Public Health*, *12*(6), 6455–6474.

Hidayat, M., & Darwin, R. (2017). Analisis sektor unggulan dalam pengembangan wilayah kabupaten kepulauan meranti. *Media Trend*, *12*(2), 156–167.

Kadir, D., & Pd, M. (2015). Statistika terapan: konsep. *contoh dan analisis data dengan program spss/lisrel dalam penelitian, PT Raja Grafindo Persada, Jakarta*.

Kesumawati, N., Retta, A. M., & Sari, N. (2017). Pengantar statistika penelitian. *Jakarta: PT. RajaGrafindo Persada*.

Kolokoltsev, M., Ambartsumyan, R., Romanova, E., Limarenko, O., Vorozheikin, A., Lozovaya, M., Vrachinskaya, T., & Aganov, S. (2023). Effectiveness of sports-oriented physical education of students using basketball. *Journal of Physical Education and Sport*, *23*(4), 810–816.

Kolokoltsev, M., Ambartsumyan, R., Vyazovichenko, Y., Lukashevich, E., Vorozheikin, A., Samoylova, G., Balashkevich, N., Petrova-Gotova, T., Arnst, N., & Tarasov, A. (2023). Physical education in 17-19-year-old girls with different psychological gender. *Journal of Physical Education and Sport*, *23*(2), 379–384.

Marques, A., Corrales, F. R. G., Martins, J., Catunda, R., & Sarmento, H. (2017). Association between physical education, school-based physical activity, and academic performance: a systematic review. *Retos: Nuevas Tendencias En Educación Física, Deporte y Recreación*, *31*, 316–320.

Mora-Gonzalez, J., Esteban-Cornejo, I., Cadenas-Sanchez, C., Migueles, J. H., Molina-Garcia, P., Rodriguez-Ayllon, M., Henriksson, P., Pontifex, M. B., Catena, A., & Ortega, F. B. (2019). Physical fitness, physical activity, and the executive function in children with overweight and obesity. *The Journal of Pediatrics*, *208*, 50–56.

Muhajir, M. (2017). *Pendidikan jasmani, olahraga dan kesehatan: buku guru SMP/MTs kelas VII*. Kementerian Pendidikan dan Kebudayaan.

Nugraha, B. (2015). Pendidikan jasmani olahraga usia dini. *Jurnal Pendidikan Anak*, *4*(1).

Potdevin, F., Vors, O., Huchez, A., Lamour, M., Davids, K., & Schnitzler, C. (2018). How can video feedback be used in physical education to support novice learning in gymnastics? Effects on motor learning, self-assessment and motivation. *Physical Education and Sport Pedagogy*, *23*(6), 559–574.

Raiola, G. (2017). Motor learning and teaching method. *Journal of Physical Education and Sport*, *17*, 2239–2243.

Raja, R., & Nagasubramani, P. C. (2018). Impact of modern technology in education. *Journal of Applied and Advanced Research*, *3*(1), 33–35.

Siedentop, D., & Van der Mars, H. (2022). *Introduction to physical education, fitness, and sport*. Human kinetics.

Silverman, S. (2017). Attitude research in physical education: A review. *Journal of Teaching in Physical Education*, *36*(3), 303–312.

Statistik, B. P. (2020). Kota Padang. *Kota Padang Dalam Angka–Penyediaan Data Untuk Perencanaan Pembangunan*.

Sugiyono, M. P. K. (2016). Metode penelitian dan pengembangan research and development, CV. *Alfabeta, Bandung*.

Vala, R., Valová, M., Dráždilová, P., & Litschamnnová, M. (2022). The physical education performance evolution of university students in athletics. *Journal of Physical Education and Sport*, *22*(4), 1086–1093.

Wayangakau, I. H., & Loupatty, M. (2022). Indonesian Physical Fitness Test Application Assessment Android-Based. *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*, *5*(2), 12595–12605.

Welis, W., Yendrizal, Darni, & Mario, D. T. (2023). Physical fitness of students in Indonesian during the COVID-19 period: Physical activity, body mass index, and socioeconomic status. *Physical Activity Review*, *11*(1), 77–87. https://doi.org/10.16926/par.2023.11.10

Zhang, X., Chen, Y., Hu, L., & Wang, Y. (2022). The metaverse in education: Definition, framework, features, potential applications, challenges, and future research topics. *Frontiers in Psychology*, *13*, 6063.