Comparison of the Impact of Traditional Games and Small Games on Students' Physical Fitness: A Study at Elementary school

May Nadira Yovira[1], Bafirman HB[2], Eri Barlian[3], Emral[4], Fiky Zarya[5]

Department of Sports Education, Faculty of Sports Science, Padang State University, Indonesia[14]
Department of Sports Coaching, Faculty of Sports Science, Padang State University, Indonesia[3]
Department of Health and Recreation, Faculty of Sports Science, Padang State University, Indonesia[25]

Abstract

The purpose of this study is for teachers to know which game method is more feasible to use for the preparation of physical education learning programs on physical fitness. This type of research is quantitative associative with a quasi-experimental approach. The design of this study is a 2 x 2 factorial design. The population in this study was all students of Elementary school 67/V Tanjung Bojo, Batang Asam District, Tanjung Jabung Barat Regency, Jambi, totaling 117 people. Samples were taken using probability sampling, namely proportionate stratified random sampling divided by simple random sampling totaling 24 students, then grouped using matching ordinal pairing. The research instrument uses the TKJI test (Indonesian Physical Fitness Test). Data were analyzed by path analysis through 2-path AVAVA testing at $\alpha = 0.05$. The results of hypothesis testing show: (1) There are differences in the level of physical fitness based on the provision of game forms where it is found in the table of hypothesis test results on the game row that a significance value of 0.000 is obtained, (2) There are differences in physical fitness levels based on test tests where there is a hypothesis test result table on the test row obtained a significance value of 0.001, (3) There is an interaction between game forms and test tests in determining the level physical fitness where found in the table of hypothesis test results in the test game row obtained a significance value of 0.04, (4) The average value of pre-test results of the physical fitness level of children who were given small games (15,917) was higher than children who were given traditional games (13,833), (5) The average post-test score of the physical fitness level of children given small games (15.33) was higher than children who were given traditional games (17,500). It was concluded that the provision of learning programs with small or traditional game methods both have an influence on students' physical fitness, but small games with modifications focused on students will have more influence on physical fitness.

How to Cite

✉ Correspondence address :
  E-mail: fikyzarya160416@gmail.com

INTRODUCTION

Physical education is one of the important aspects in the formation of character and physical health of students in Elementary school (Trajkovik et al. 2018; Vernadakis et al. 2015). Good physical fitness can help increase endurance, reduce the risk of disease, and increase concentration and productivity in learning. Therefore, Therefore has significance that sports instructors utilize effective learning methods to improve students' physical fitness (Castellar et al. 2015; Tokac, Novak, and Thompson 2019). Previous research may have shown that traditional games and small games can be an alternative in physical education learning. However, there have been no studies that specifically compare the impact of the two game methods on the physical condition of the pupils. Therefore, this study was conducted to fill the gap and provide teachers with a deeper understanding of the choice of more effective learning methods (Health et al. 2016; Hwang et al. 2016).

With the impact of the two game methods on the physical condition of the pupils methods on the physical fitness of Elementary school 67/V Tanjung Bojo students, this research will be an important reference for educators in choosing the most appropriate learning strategies to improve students' physical health and quality of life (Furió et al. 2015; Health et al. 2016). Additionally, this study has the potential to contribute further to the advancement and enhancement of primary school physical education instruction. at large (Brezovszky et al. 2019; Vlachopoulos and Makri 2017). At present, the study of the impact of old-school games and small games on the physical fitness of students in the Elementary school environment is still a relevant and interesting research topic (Bakker, van den Heuvel-Panhuizen, and Robitzsch 2015; Hwang, Chiu, and Chen 2015). Some previous studies may have investigated certain aspects related to physical education, but not many have specifically compared the two gaming methods comprehensively (Partovi and Razavi 2019; Smith et al. 2015). Therefore, this research has a high relevance in making additional contributions to the field of physical education and student health.

This study is anticipated to close a knowledge gap and offer deeper understanding of the efficiency of both game approaches in enhancing students' physical fitness at the primary school level using a pseudo-experimental methodology and a 2 x 2 factorial design. The findings of this study can be used to create more effective learning programs that focus on health, and they may also be used to offer suggestions to educators and decision-makers in an effort to raise the standard of physical education and student health (Garneli, Giannakos, and Chorianopoulos 2017; Miller et al. 2015). This study makes a significant contribution and offers two standout novel values. First, this study presents a direct comparison between the effects of traditional games and small games on students' physical fitness in the context of the primary school setting. (Kusnandar et al. 2019; Lu and Liu 2015). To date, no studies have specifically investigated the significant differences between these two gaming methods in the context of physical education at the elementary level. Secondly, this study introduced a pseudo- two-by-two factorial experimental design, which made it possible to identify and test the interaction between the form of play and the type of test upon the degree of pupils' health.

Its contribution is very strong, because the The study's findings will give teachers in these fields a more comprehensive and pertinent grasp of developing more effective physical education learning programs (Ilahi 2023; Siswanto et al. 2022). In addition, the recommendations resulting from this study have the potential to have a positive impact on efforts to improve the quality of physical education and student health at the Elementary school level in a more holistic and targeted manner (Aguss 2020; Bariyah, Ashari, and Yuliawan 2022). The results of this study are expected to provide valuable information for physical education teachers in developing more effective and targeted learning programs to improve students' physical fitness. In addition, an understanding of the differences in influence between traditional games and small games can provide input for the development of physical education curriculum in Elementary schools. Thus, this research is expected to make a positive contribution in an effort to improve the quality of physical education learning and overall student health.

METHODS

This research will be carried out using a a 2 x 2 factorial technique that is quasi-experimental. The research steps will be explained systematically as follows:

Population and Sample Identification: The study population was all students at Elementary school 67/V Tanjung Bojo, Batang Asam District, Tanjung Jabung Barat Regency, Jambi, totaling 117 people. Samples will be taken using probability sampling with a proportionate strati-

fied random sampling approach, which is then divided into two groups according to the two factors studied, namely the form of the game (traditional and small) and the type of test (test test).

Sample Selection and Group Division: From the student population, a total of 24 students will be randomly selected to be the research sample. Next, the sample will be divided into two groups, where each group consists of students who have similar characteristics to reduce the influence of unwanted outside variables. This group division is carried out using matching ordinal pairing

Data Collection: Data will be collected through Health assessments utilizing the Indonesian Physical Fitness Test (TKJI) which has been tested for validity and reliability. This test will be conducted before (pre-test) and after (post-test) the provision of learning programs with both game methods

Implementation of Learning Program: After the division of groups, both groups will be given physical education learning programs using their respective game methods, namely traditional and small. Learning programs will be designed consistently for both groups with a focus on improving students' physical fitness.

Data Analysis: The collected data will be analyzed using path analysis through 2-path AVAVA testing with a with a 0.05 threshold of significance. This investigation will be used to test differences in physical fitness levels based on the provision of game forms (traditional and small), test tests, and interactions between game forms and test tests.

Results interpretation: In order to fully comprehend the impact of both game-based learning strategies on students' physical fitness, the data analysis results will be evaluated. The study's conclusions will make a significant contribution in crafting more effective and health-oriented physical education learning programs of students at the primary school level.

RESULTS AND DISCUSSION

Traditional Games
Pree-test

Based on physical fitness data collected using TKJI (Indonesian Physical Fitness Test) to students The average score was 15.7 and the standard deviation was 1.42. The highest score was 18, the lowest score was 13, and the average score was. The distribution of data frequency can be examined in more depth in the following **Table 1.**
.

Table 1. Frequency Distribution of Traditional Games (Pre-Test)

Interval Class	Fa	Fr	Information
> 17,8	1	8%	Excellent
16,4 - 17,7	2	17%	Good
15 - 16,3	4	33%	Keep
13,6 - 14,9	4	33%	Less
< 13,5	1	8%	Very Lacking
Sum	12	100%	

Based on the **Table 1** above, the results of the TKJI physical fitness test Regency obtained a > score of 17.8 with a very good classification of 1 person (8%), a value of 16.4 - 17.7 with a good classification of 2 people (17%), a value of 15 - 16.3 with enough as many as 4 people (33%), a value of 13.6 - 14.9 with a classification of less than 4 people (33%), Values below < 13.5 with a classification of very less than 1 person (8%).

Post-test
Based on physical fitness data collected using TKJI (Indonesian Physical Fitness Test) to students, the highest score was 17, the lowest score was 11, the average value was 14.3 and the standard deviation was 1.57. For more details, the distribution of data frequency can be seen in the following **Table 2.**

Table 2. Traditional Game Frequency Distribution (Post-Test)

Interval Class	Fa	Fr	Information
> 16,7	1	8%	Excellent
15,1 - 16,6	1	8%	Good
13,5 – 15	6	50%	Keep
11,9 - 13,4	3	25%	Less
< 11,8	1	8%	Very Lacking
Sum	12	100%	

Based on the **Table 2** above, it was found that the results of the TKJI physical fitness test obtained a > score of 16.7 with a very good classification of 1 person (8%), a value of 15.1 - 16.6 with a good classification of 1 person (8%), a value of 13.5 - 15 with enough as many as 6 people (50%), a value of 11.9 - 13.4 with a classification of less than 3 people (25%), Values below < 11.8 with a classification of very less than 1 person (8%).

Small Games
Pree-test
Based on physical fitness data collected using TKJI (Indonesian Physical Fitness Test) to

students, the highest score was obtained at 20, the lowest value at 16, an average score of 17.3 and a standard deviation of 1.25. For more details, the distribution of data frequency can be seen in the following **Table 3.**

Table 3. Small Game Frequency Distribution (Pre-Test)

Interval Class	Fa	Fr	Information
> 19,2	1	8%	Excellent
17,9 - 19,1	5	42%	Good
16,7 - 17,8	3	25%	Keep
15,4 - 16,6	3	25%	Less
< 15,3	0	0%	Very Lacking
Sum	12	100%	

Based on the **Table 3** above, it was found that the results of the TKJI physical fitness test obtained a > score of 19.2 with a very good classification of 1 person (8%), a value of 17.9 - 19.1 with a good classification of 5 people (42%), a value of 16.7 - 17.8 with enough as many as 3 people (25%), a value of 15.4 - 16.6 with a classification of less than 3 people (25%), Values below < 15.3 with a classification of very less none (0%).

Post-test

Based on physical fitness data collected using TKJI (Indonesian Physical Fitness Test) to students, The average score was 16.1, the standard deviation was 1.29, the highest score was 19 and the lowest score was 14. The following table provides more information about the frequency distribution of data.

Table 4. Frequency Distribution of Small Gamesl (Post-Test)

Interval Class	Fa	Fr	Information
> 18	1	8%	Excellent
16,7 - 17,9	2	17%	Good
15,5 - 16,6	4	33%	Keep
14,2 - 15,4	4	33%	Less
< 14,1	1	8%	Very Lacking
Sum	12	100%	

Based on the **Table 4** above, the results of the TKJI physical fitness test obtained a score of > 18 with a very good classification of 1 person (8%), a value of 16.7 - 17.9 with a good classification of 2 people (17%), a value of 15.5 - 16.6 with enough as many as 4 people (33%), a value of 14.2 - 15.4 with a classification of less than 4 people (33%), Values below < 14.1 with a classification of very less than 1 person (8%).

Test requirements analysis is carried out as a basis for consideration to select and establish data analysis techniques used in hypothesis testing. The testing requirements of the analysis include, normality testing, homogeneity testing and regression linearity testing.

Normality Test

By comparing the significance coefficient value with the probability value, it is possible to determine if the distribution of the data is normally distributed or not α = 0.05. This normality test is tested using Kolmogrov Smirnov and Shapiro-Wilk normality tests Normality testing is carried out with the help of SPSS 20.0. The significance value is smaller than the probability of α = 0.05. In other words, it can be concluded that the data is normally distributed.

Homogeneity Test

This homogeneity test is tested using the bartlet test Homogeneity testing using the bartlet test is carried out with the help of SPSS 20.0. The significance value is less than the probability of 0.05 based on the aforementioned facts. Alternatively put, it might be said that variables are homogeneous.

Test the hypothesis

Hypothesis testing in this study used two-way anova. Bridgmon & Martin, (2012) states that Two-Factor Anova is used to assess the main effect of two independent factors on the same dependent variable as well as the interaction effect of the independent variables on the dependent variable. The goal of this two-track anova is to determine whether the numerous criteria investigated have any bearing on the anticipated outcomes. Three presumptions are also mentioned as being true for the two-line anova test: Observational independence, homogeneity of variance, and normality.

In variance analysis, two paths have column variables and row variables. Thus, interaction between columns and rows will be obtained. Analysis of two-path variance using data categorized according to two different factors. One factor is used to arrange sample data in distinct rows, whilst the other factor is employed to arrange sample data in columns.

From this output, we can see the average value depending on the outcomes of the physical fitness testsn the form of play and test test. Judging from the average pre-test result of physical fitness of children who were given traditional games was 15.33. While the average value of post-test results of physical fitness of children who were given traditional games was 13.83. Judging from the average value the outcomes of the phy-

sical fitness pre-test of children who were given small games was 17.50. While the average value of post-test results of physical fitness of children who were given small games was 15.92.

This hypothesis test is tested using the two-way anova test Hypothesis testing using the two-way anova test is carried out with the help of SPSS 20.0 and the basis for decision making is as follows. The Significance value is obtained from the category of methods, test tests and game forms TKJI test which will later be compared with probability α = 0.05.

From these results in the first hypothesis found the conclusion that A significant value of 0.000, which indicates less than 0.05, is acquired from the table of hypothesis test results located in the game row, indicating that Ho was rejected and Ha was accepted or in other words "there is a difference in the average score of physical fitness test results based on giving game forms to students at Elementary school 67/V Tanjung Bojo, Batang Asam District, West Tanjung Jabung Regency, Jambi". In addition, the second hypothesis explains that Based on the table of findings from the hypothesis test, it was discovered that the test line had a significance value of 0.001, which is less than 0.05, leading to the conclusion that Ho was rejected and Ha was accepted, or, to put it another way, "there is a difference in the average score of physical fitness level test results based on test tests on students at Elementary school 67/V Tanjung Bojo, Batang Asam District, West Tanjung Jabung Regency, Jambi". And finally, on the third hypothesis it is concluded that It can be deduced that Ho was rejected and Ha was accepted based on the table of hypothesis test results seen on the test line because the game obtained a significance value of 0.04 (less than 0.05) in other words "there is an interaction of game forms and test tests in determining the level of physical fitness in students at Elementary school 67 / V Tanjung Bojo, Batang Asam District, West Tanjung Jabung Regency, Jambi".

The Mean value is obtained from the pre-test and post-test categories given traditional games and small games that will be compared to each other.

The fourth hypothesis explains that According to the hypothetical test results table, the traditional game line that was tested early (pre-test) found a mean value of 13,833, while the small game line that was tested early (pre-test) found a mean value of 15,917. This means that the difference in the average value of the pre-test is greater for the traditional game line. results of the physical fitness level of children who were given small games was higher than children who were given traditional games. And the fifth hypothesis states that Based on the table of results from the hypothesis test, it was discovered that the average value of the traditional game line tested after the post-test found a mean value of 15,333 while the small game line tested before the post-test found a mean value of 17,500. It can therefore be said that the difference in the average value of the post-test was caused by the small game line. results of the physical fitness level of children who were given small games was higher than children who were given traditional games.

The interaction between the game form and the test test also showed interesting results. This indicates that the effect of both types of play on a student's physical fitness may be influenced by the type of test used to measure that fitness level (Fadda et al. 2022; Liu et al. 2020; Rafiei Milajerdi et al. 2021). As a result, that is essential that teachers of sports take things into account. two factors in crafting effective and health-oriented learning programs (Ariyanto, Triansyah, and Gustian 2020; Prayitno, Rahmawati, and Pradana 2022). The average pre-test and post-test results showed improved physical fitness in both groups of students given small and traditional games. Although small games showed higher improvement in the post-test, this difference was not statistically significant (Cocca et al. 2020; Iasha et al. 2020; Kolovelonis and Goudas 2023). However, it is still important to appreciate the improvement in physical fitness in both groups, as these results suggest that both methods of play can make a positive contribution in improving the physical fitness levels of students in primary school (A'la 2019; Lestari 2020).

An in-depth interpretation of the results of this study reveals the relevance and potential significance possessed by both types of games in improving students' physical fitness at the primary school level (Perdima and Kristiawan 2021; Undari 2019). The finding that specially modified small games were more effective in improving physical fitness levels than traditional games suggests that a student-focused approach to physical education learning program design has a positive and significant impact (Dewi and Verawati 2022; Mashuri 2021). This has important implications for educators and policymakers to reconsider the learning strategies used in teaching physical education. In this context, it is important to pay more attention to the development and use of small games with modifications that correspond to the characteristics of students, in order for learning to be more interesting, meaningful and have a real impact on the physical health of students (Armansyah and Hadi 2022; Kusmiati and Su-

marno 2018).

The interaction between the form of play and the test highlights the complexity of the influence of these two factors on students' physical fitness. These results suggest that the type of test used to measure physical fitness levels may influence the impact of both types of play (Adhariah 2018; Latif et al. 2019). Therefore, to optimize the benefits of physical education learning, teachers need to consider both the form of play and the type of test used carefully and appropriately. The effective use of a combination of the two can give better results in improving students' physical fitness. In addition, these findings also emphasize the importance of using valid and reliable fitness measurement instruments in physical education research and learning. With a deep understanding of these complex interactions, educators have the opportunity to design more effective and targeted learning programs to improve students' physical quality and health, and create a positive and impactful learning environment in achieving physical education goals holistically (Apriani, Sari, and Alpen 2021; Asriansyah 2019).

Consider Previous Research: Data benchmarking can begin by looking for previous research investigating similar topics, Specifically, how traditional games and little games affect primary school kids' level of physical fitness. We can determine whether this study's findings support prior findings or whether there is a discrepancy by examining the findings of earlier investigations. significant difference in the influence of the two types of games (Jahrir and Syafruddin 2022; Priyatama 2022).

Review Statistical Test Results Data benchmarking should also involve the results of statistical tests used to analyze the data. Whether the significance value of the results of this statistical test is consistent with previous research. The results of other relevant statistical tests may provide additional information about the degree to which the variables are correlated under study (Gil-Arias et al. 2021; Oliveira et al. 2020). Pay Attention to Other Variables That May Affect In addition, data benchmarking must take into account other variables that may affect the results of this and other studies. By considering these factors, it can be easier to understand the context and generalizability of research results. By benchmarking data holistically and systematically, we can better understand the unique place of this research in the broader scientific literature and identify valuable implications and recommendations for the development of better, physical health-oriented physical education of students.

CONCLUSION

This research produces very strong and relevant conclusions in accordance with the research objectives. From In Elementary school 67/V Tanjung Bojo, Batang Asam District, West Tanjung Jabung Regency, Jambi, it has been demonstrated through data analysis that offering physical education learning programs that utilize simple or traditional sports has a substantial impact on the improvement of students' physical fitness. Although both had a positive influence, small games with special modifications focused on students showed a stronger impact in improving physical fitness levels. These results provide clear guidance for teachers in crafting more effective and health-oriented physical education learning programs. The practical implication of the study is the importance of integrating relevant and meaningful little games in the physical education curriculum at the primary school level, in the hope of improving students' overall quality of life and health.

REFERENCES

A'la, Miftachul. 2019. "Penguatan Karakter Toleransi Melalui Permainan Tradisional Dalam Pembelajaran PJOK Di Sekolah Dasar." MAGISTRA: Media Pengembangan Ilmu Pendidikan Dasar Dan Keislaman 10(2):130–45.

Adhariah, Ida. 2018. "Pengaruh Permainan Tradisional Terhadap Peningkatan Kebugaran Jasmani Siswa." Ibtida'i: Jurnal Kependidikan Dasar 5(2):273–88.

Aguss, Rachmi Marsheilla. 2020. "Pengembangan Model Permainan Sepatu Batok Untuk PembelajaranSepak Bola Pendidikan Jasmani, Olahraga Dan Kesehatan SiswaSekolah Dasar." SPORTMu: Jurnal Pendidikan Olahraga 1(01):43–53. doi: 10.32528/sport-mu.v1i01.3052.

Apriani, Leni, Merlina Sari, and Joni Alpen. 2021. "Studi Eksperimen Pada Unit Kegiatan Mahasiswa Petanque Universitas Islam Riau: Meningkatkan Kesegaran Jasmani Melalui Permainan Hadang Dan Bentengen." Jurnal MensSana 6(1):50–55.

Ariyanto, Ariyanto, Andika Triansyah, and Uray Gustian. 2020. "Penggunaan Permainan Tradisional Untuk Meningkatkan Keterampilan Gerak Fundamental Siswa Sekolah Dasar." Jurnal Pendidikan Jasmani Indonesia 16(1):78–91.

Armansyah, Armansyah, and Supian Hadi. 2022. "Meningkatkan Kebugaran Jasmani Siswa Kelas V Sekolah Dasar Menggunakan Gaya Mengajar Komando Dengan Permainan Tradisional."

Asriansyah, Asriansyah. 2019. "Pengaruh Permainan Tradisional Terhadap Kebugaran Jasmani Sis-

wa Sma Negeri 4 Kayu Agung." in Seminar Nasional Olahraga. Vol. 1.

Bakker, Marjoke, Marja van den Heuvel-Panhuizen, and Alexander Robitzsch. 2015. "Effects of Playing Mathematics Computer Games on Primary School Students' Multiplicative Reasoning Ability." Contemporary Educational Psychology 40:55–71. doi: 10.1016/j.cedpsych.2014.09.001.

Bariyah, Khoerul, Irvan Anugrah Ashari, and Ely Yuliawan. 2022. "Pengaruh Permainan Tradisional Masyarakat Jambi Terhadap Peningkatan Kebugaran Jasmani Siswa Sekolah Dasar." Jurnal Pendidikan Tematik Dikdas 7(2):156–65. doi: 10.22437/jptd.v7i2.21544.

Brezovszky, Boglárka, Jake McMullen, Koen Veermans, Minna M. Hannula-Sormunen, Gabriela Rodríguez-Aflecht, Nonmanut Pongsakdi, Eero Laakkonen, and Erno Lehtinen. 2019. "Effects of a Mathematics Game-Based Learning Environment on Primary School Students' Adaptive Number Knowledge." Computers & Education 128:63–74. doi: 10.1016/j.compedu.2018.09.011.

Bridgmon, Krista D., and William E. Martin. 2012. Quantitative and Statistical Research Methods: From Hypothesis to Results. San Francisco: Jossey-Bass A Wiley Imprint.

Castellar, Elena Nunez, Anissa All, Lieven De Marez, and Jan Van Looy. 2015. "Cognitive Abilities, Digital Games and Arithmetic Performance Enhancement: A Study Comparing the Effects of a Math Game and Paper Exercises." Computers & Education 85:123–33. doi: 10.1016/j.compedu.2014.12.021.

Cocca, Armando, Francisco Espino Verdugo, Luis Tomás Ródenas Cuenca, and Michaela Cocca. 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 17(13):4883.

Dewi, Rahma, and Indah Verawati. 2022. "The Effect of Manipulative Games to Improve Fundamental Motor Skills in Elementary school Students." International Journal of Education in Mathematics, Science, and Technology (IJEMST) 10(01):24–37.

Fadda, Daniela, Marta Pellegrini, Giuliano Vivanet, and Claudio Zandonella Callegher. 2022. "Effects of Digital Games on Student Motivation in Mathematics: A Meta-analysis in K-12." Journal of Computer Assisted Learning 38(1):304–25.

Furió, David, M-C Juan, Ignacio Seguí, and Roberto Vivó. 2015. "Mobile Learning vs. Traditional Classroom Lessons: A Comparative Study." Journal of Computer Assisted Learning 31(3):189–201. doi: 10.1111/jcal.12071.

Garneli, Varvara, Michail Giannakos, and Konstantinos Chorianopoulos. 2017. "Serious Games as a Malleable Learning Medium: The Effects of Narrative, Gameplay, and Making on Students' Performance and Attitudes." British Journal of Educational Technology 48(3):842–59.

Gil-Arias, Alexander, Stephen Harvey, Francisco García-Herreros, Sixto González-Víllora, Alba Práxedes, and Alberto Moreno. 2021. "Effect of a Hybrid Teaching Games for Understanding/Sport Education Unit on Elementary Students' Self-Determined Motivation in Physical Education." European Physical Education Review 27(2):366–83.

Health, Institute of Digital Media and Child Development Working Group on Games for, Tom Baranowski, Fran Blumberg, Richard Buday, Ann DeSmet, Lynn E. Fiellin, C. Shawn Green, Pamela M. Kato, Amy Shirong Lu, and Ann E. Maloney. 2016. "Games for Health for Children—Current Status and Needed Research." Games for Health Journal 5(1):1–12. doi: 10.1089/g4h.2015.0026.

Hwang, Gwo-Jen, Li-Yu Chiu, and Chih-Hung Chen. 2015. "A Contextual Game-Based Learning Approach to Improving Students' Inquiry-Based Learning Performance in Social Studies Courses." Computers & Education 81:13–25. doi: 10.1016/j.compedu.2014.09.006.

Hwang, Gwo-Jen, Po-Han Wu, Chi-Chang Chen, and Nien-Ting Tu. 2016. "Effects of an Augmented Reality-Based Educational Game on Students' Learning Achievements and Attitudes in Real-World Observations." Interactive Learning Environments 24(8):1895–1906. doi: 10.1080/10494820.2015.1057747.

Iasha, Vina, M. Iqbal Al Ghozali, Asep Supena, Endang Wahyudiana, Bramianto Setiawan, and Yetty Auliaty. 2020. "The Traditional Games Effect on Improving Students Working Memory Capacity in Primary Schools." Pp. 1–5 in Proceedings of the 4th International Conference on Learning Innovation and Quality Education.

Ilahi, Bogy Restu. 2023. "Pengaruh Permainan Tradisional Hadang Terhadap Tingkat Kebugaran Jasmani Siswa Sd Negeri 72 Kota Bengkulu." Halaman Olahraga Nusantara: Jurnal Ilmu Keolahragaan 4(1):44–50. doi: 10.56667/dejournal.v4i1.906.

Jahrir, Andi Sahrul, and Muhammad Akbar Syafruddin. 2022. "Pengaruh Model Pembelajaran Koperatif Melalui Permainan Tradisional Terhadap Peningkatan Kesegaran Jasmani Upt 6/86 Biru Kabupaten Bone." Jurnal Ilmiah STOK Bina Guna Medan 10(2):84–89.

Kolovelonis, Athanasios, and Marios Goudas. 2023. "Acute Enhancement of Executive Functions through Cognitively Challenging Physical Activity Games in Elementary Physical Education." European Physical Education Review 29(2):268–85.

Kusmiati, Ai Melis, and Gano Sumarno. 2018. "Pengaruh Permainan Tradisional Terhadap Kemampuan Perseptual Motorik Anak Di Elementary

school Margawatu II Garut Kota." TEGAR: Journal of Teaching Physical Education in Elementary school 1(2):17–23.

Kusnandar, Kusnandar, Dyah Umiarni Purnamasari, Panuwun Joko Nurcahyo, and Endo Darjito. 2019. "Pengaruh Permainan Tradisional Banyumas Gol-Golan Terhadap Tingkat Kebugaran Jasmani Siswa Sekolah Dasar Di Kabupaten Banyumas." Physical Activity Journal (PAJU) 1(1):18–26. doi: 10.20884/1.paju.2019.1.1.1996.

Latif, Moch, Faiz Faozi, Rafdlal Saeful Bakhri, Farid Harja, and Arfin Deri Listiandi. 2019. "Pengaruh Permainan Tradisional Terhadap Minat Siswa Dalam Kegiatan Pembelajaran Pendidikan Jasmani, Olahraga, Dan Kesehatan Di SMAN 1 Cikembar." Physical Activity Journal (PAJU) 1(1):82–90.

Lestari, Dyah Frika. 2020. "Pengembangan Model Pembelajaran Aktivitas Jasmani Melalui Permainan Tradisional Bagi Siswa Sekolah Dasar." Jurnal Pendidikan Jasmani, Olahraga Dan Kesehatan Undiksha 8(1):7–12.

Liu, Wenxi, Nan Zeng, Daniel J. McDonough, and Zan Gao. 2020. "Effect of Active Video Games on Healthy Children's Fundamental Motor Skills and Physical Fitness: A Systematic Review." International Journal of Environmental Research and Public Health 17(21):8264.

Lu, Su-Ju, and Ying-Chieh Liu. 2015. "Integrating Augmented Reality Technology to Enhance Children's Learning in Marine Education." Environmental Education Research 21(4):525–41. doi: 10.1080/13504622.2014.911247.

Mashuri, Hendra. 2021. "Traditional Games to Reinforce the Character of Students in Terms of Educational Qualifications: A Meta-Analysis." Jurnal SPORTIF: Jurnal Penelitian Pembelajaran 7(4):15–26.

Miller, Andrew, Erin M. Christensen, Narelle Eather, John Sproule, Laura Annis-Brown, and David Revalds Lubans. 2015. "The PLUNGE Randomized Controlled Trial: Evaluation of a Games-Based Physical Activity Professional Learning Program in Primary School Physical Education." Preventive Medicine 74:1–8. doi: 10.1016/j.ypmed.2015.02.002.

Oliveira, Crystian B., Rafael Z. Pinto, Bruna T. C. Saraiva, William R. Tebar, Leandro D. Delfino, Marcia R. Franco, Claudiele C. M. Silva, and Diego G. D. Christofaro. 2020. "Effects of Active Video Games on Children and Adolescents: A Systematic Review with Meta-analysis." Scandinavian Journal of Medicine & Science in Sports 30(1):4–12.

Partovi, Tahereh, and Majid Reza Razavi. 2019. "The Effect of Game-Based Learning on Academic Achievement Motivation of Elementary school Students." Learning and Motivation 68:101592. doi: 10.1016/j.lmot.2019.101592.

Perdima, Feby Elra, and Muhammad Kristiawan. 2021. "Nilai-Nilai Karakter Pada Permainan Tradisional Hadang Di Sekolah Dasar." Jurnal Basicedu 5(6):5342–51.

Prayitno, Harun Joko, Faradiyah Nurul Rahmawati, and Fajar Gemilang Pradana. 2022. "Pembentukan Karakter Anak Usia Sekolah Dasar Melalui Permainan Tradisional." Jurnal Pemberdayaan Masyarakat 1(1):1–9.

Priyatama, Mochammad Okta. 2022. "Pengaruh Permainan Gobak Sodor Terhadap Peningkatan Kesegaran Jasmani Di Sma Al-Islam Krian."

Rafiei Milajerdi, Homa, Mahmoud Sheikh, Mahboubeh Ghayour Najafabadi, Behnaz Saghaei, Naser Naghdi, and Deborah Dewey. 2021. "The Effects of Physical Activity and Exergaming on Motor Skills and Executive Functions in Children with Autism Spectrum Disorder." Games for Health Journal 10(1):33–42.

Siswanto, Siswanto, M. E. Winarno, Sapto Adi, and Edi Setiawan. 2022. "Bagaimana Dampak Permainan Tradisional Pada Perkembangan Motorik Siswa: Systematic Literature Review." Jurnal Patriot 4(4):364–79. doi: 10.24036/patriot.v4i4.886.

Smith, Lindsey, Stephen Harvey, Louise Savory, Stuart Fairclough, Stephen Kozub, and Catherine Kerr. 2015. "Physical Activity Levels and Motivational Responses of Boys and Girls: A Comparison of Direct Instruction and Tactical Games Models of Games Teaching in Physical Education." European Physical Education Review 21(1):93–113.

Tokac, Umit, Elena Novak, and Christopher G. Thompson. 2019. "Effects of Game-based Learning on Students' Mathematics Achievement: A Meta-analysis." Journal of Computer Assisted Learning 35(3):407–20. doi: 10.1111/jcal.12347.

Trajkovik, Vladimir, Toni Malinovski, Tatjana Vasileva-Stojanovska, and Marina Vasileva. 2018. "Traditional Games in Elementary school: Relationships of Student's Personality Traits, Motivation and Experience with Learning Outcomes." PloS One 13(8):e0202172. doi: 10.1371/journal.pone.0202172.

Undari, Siska Nova. 2019. "Pengembangan Model Permainan Gobag Sodor Untuk Menarik Minat Siswa Sekolah Dasar."

Vernadakis, Nikolaos, Marina Papastergiou, Eleni Zetou, and Panagiotis Antoniou. 2015. "The Impact of an Exergame-Based Intervention on Children's Fundamental Motor Skills." Computers & Education 83:90–102. doi: 10.1016/j.compedu.2015.01.001.

Vlachopoulos, Dimitrios, and Agoritsa Makri. 2017. "The Effect of Games and Simulations on Higher Education: A Systematic Literature Review." International Journal of Educational Technology in Higher Education 14(1):1–33. doi: 10.1186/s41239-017-0062-1.