

Impact of *Hadang* and *Bentengan* Game on Students' Physical Fitness Levels

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ABSTRACT

This research aims to determine the effectiveness of blocking and fortification games on the physical fitness level of elementary school students. The research method used was experimental using a two-group pretest-posttest design. The sampling technique used was purposive sampling, and the sample consisted of 54 students. Data collection techniques are 1) documents taken from the results of learning notes during the treatment delivery process, and 2) physical fitness tests is to know physical fitness level. The data analysis technique uses the t-test, but the data analysed must have a normal distribution so that the level of normality and homogeneity of the data is first tested. The t-test results for the Hadang and Bentengan games showed statistically significant increases in physical fitness (e.g., $t = 29.105$ for Hadang, $t = 21.236$ for Bentengan, both $p < 0.05$), so it can be concluded that there was an increase in physical fitness through the Bentengan game. Students' physical fitness levels experienced a significant increase in sprints, pull-ups, sit-ups, vertical jumps, and short-distance running activities. The results of this research also have implications for the development of various types of traditional games for other physical fitness learning activities or other health, sports, and physical fitness learning activities. Teachers can design types of games as teaching techniques and can adjust them to the age needs of students, such as elementary or junior high school levels.

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1. INTRODUCTION

The learning process for elementary school students must be understood in the context of their age development. Teachers must use various media or learning models that are appropriate to their age so that learning activities are fun (Allen & Kelly, 2015). Moreover, changes to the curriculum that have been determined by the government are a challenge for teachers to make learning activities relevant and in line with students' needs. As in physical fitness learning, elementary school students require learning activities that can build their motivation and focus. Moreover, outdoor sports activities provide many opportunities for them to do lots of free movement and play with their friends. Thus,

teachers have challenges not only in preparing instructional materials or media but also in dealing with how to deal with students so that they remain focused on physical fitness learning activities. Moreover, physical fitness learning is an important factor for students to be able to carry out various physical activities and sports, besides good physical fitness can also have a positive impact on the development of student achievement, both cognitively, affectively and psychometrically (Suhartoyo et al., 2019).

The results of an evaluation of physical fitness learning for students at one of the state elementary schools in East Oku District concluded that students in grades four to six often did not focus and played with their peers when physical fitness learning activities took place. Moreover, physical fitness learning activity is carried out outdoors which provides wide range of movement for students. So, this situation has an impact on the level of learning outcomes which are not optimal, and the scores obtained by students in physical fitness learning as much as 60% have not reached the minimum completeness score set at 75. The results of questions and answers with the students concluded that they liked learning activities carried out while playing.

Therefore, this study focuses on using games in physical fitness learning, because games can accommodate students' desire to play while learning. Moreover, many studies have proven the effectiveness of games in the learning process or in improving student achievement. Even traditional games have been developed to improve students' motor learning development (Siswanto et al., 2022). In addition, the integration of traditional games influences their learning experiences or outcomes and the level of motivation of students who have different personalities (Mudzakir, 2020; Trajkovik et al., 2018). Many traditional games have been studied for physical fitness learning activities in elementary or junior high schools. Aguss (2020) has proven the use of *batok* shoe games for elementary school students' soccer learning and produces an effective learning process. Other traditional games that have been previously researched to improve the physical fitness of elementary school students are *Gobak Sodor* and *Bentengan* (Listyaningrum, 2018; Riyandi et al., 2021). The traditional adventure game *Gobak Sodor* was once developed into a game that is suitable for improving students' problem-solving abilities in the learning process (Gustira et al., 2023).

Other studies have also concluded that learning programs using small or traditional game methods equally have an impact on student's physical fitness (Bariyah et al., 2022; Yovira et al., 2023), the traditional Banyumas game *gol-golan* has also had a positive impact on students' physical fitness levels (Kusnandar et al., 2019). Banyak permainan tradisional yang telah diteliti untuk aktivitas pembelajaran kebugaran jasmani di sekolah dasar ataupun sekolah tingkat menengah pertama. Dari temuan masalah umum dalam pembelajaran kebugaran jasmani di sekolah dasar terkait dengan penggunaan strategi pembelajaran, dan data temuan masalah khusus dalam pembelajaran kebugaran jasmani di state elementary schools in East Oku District, maka penggunaan permainan tradisional menjadi pilihan solusi untuk permasalahan yang sedang dihadapi. The findings from previous studies are specifically related to the challenges and problems in research that is currently being conducted in basic physical fitness education.

Thus, it can be said that traditional games can be used not only as a learning medium but also to design improved problem-solving for students with different personalities. Based on previous research, this research focuses on two types of traditional games, namely the game of *hadang* and *bentengan*, to increase the physical fitness level in physical fitness learning for elementary school students who have different levels of personality diversity and are dominated by students' high desire to play rather than study with a high level of concentration. The use of this game is a physical fitness learning model based on students' low levels of concentration during physical fitness learning activities. So, this research is not only oriented towards increasing students' physical fitness levels but can also overcome the problem of students' desire to play during the teaching and learning physical fitness process. Students can enjoy fun learning activities.

From this explanation, this research aims to evaluate the effectiveness of the *Hadang* and *Bentengan* games in improving the physical fitness and focus of elementary school students, particularly those with high play tendencies and low concentration levels. It is also hoped that the

results of this research will provide many benefits to sports teachers' understanding of the psychological conditions of students who prefer playing rather than studying with a high level of concentration. In this way, teachers can prepare appropriate games for physical fitness learning activities according to the personality or psychological conditions of elementary school students with different background levels.

2. METHODS

This research was conducted at the Bangun Harjo State Elementary School, East Oku Regency. The study was carried out from October – December 2023. The research method is experimental using a two-group pretest-posttest design (Creswell & Creswell, 2018). The use of this research method is based on the need for games that are suitable for improving students' physical fitness. Because there are many types of traditional games, it is limited to two types of games, so this method is more appropriate. Researchers divided the samples into two groups, gave an initial test, then carried out treatment and then gave a final test. This research used therapy in the form of the traditional game *hadang* on students' fitness, with a treatment frequency of 16 times. Learning activities are carried out according to the learning schedule set by the school with a time duration that has been adjusted for physical education and sports lessons for students at school. The researcher divided the sample into two groups randomly, namely groups A and B. Group A was given the traditional fort game treatment, pre-test and post-test, while group B was given the *hadang* game treatment, after which the initial and final tests were carried out again. The division of groups with this random system is assumed to have the same characteristics and needs in improving physical fitness. Thus, giving treatment to these two groups can provide the effectiveness of both types of games tested.

The sampling technique used purposive sampling and the sample consisted of 54 students. The characteristics of the sample used are 1) students from both groups have the same grade, 2) the physical fitness level of students has a low range of values, and 3) the characteristics of students during the learning process have the same character map. Data collection techniques are documents and physical fitness tests. Documents are taken from the results of learning notes during the treatment delivery process. The validity and reliability of the fitness test given has standard assessment criteria that have been established in physical fitness learning, so this assessment guide has not been retested. The assessment criteria for the physical fitness test given are (Fajrila et al., 2020; Pradana et al., 2023; Wahid & Kurniawan, 2023; Yahya et al., 2023);

- a. Sprint test with assessment criteria;

Table 1 . Normative data for sprinting aged 6-9 years & 10-12 years

6 to 9 Years (Sprint 30 meters)		Score	10 to 12 Years (Sprint 40 meter)	
Male	Female		Male	Female
up to 5.5 seconds	sd – 5.8 seconds	5	Up to 6.3 seconds	Up to – 6.7 seconds
5.6 – 6.1 seconds	5.9 – 6.6 seconds	4	6.4 – 6.9 seconds	6.8 – 7.5 seconds
6.2 – 6.9 seconds	6.7 – 7.8 seconds	3	7.0 – 7.7 seconds	7.6 – 8.3 seconds
7.0 – 8.6 seconds	7.9 – 9.2 seconds	2	7.8 – 8.8 seconds	8.4 – 9.6 seconds
8.7 – etc	9.3 – etc	1	8.9 – etc	9.7 – etc

b. Pull-up test with assessment criteria;

Table 2. Normative data for pull-up aged 6-9 years & 10-12 years

6 to 9 Years (Pull-Up)		Score	10 to 12 Years (Pull-Up)	
Male	Female		Male	Female
40 seconds and up	33 seconds and up	5	51 seconds and up	40 seconds and up
22 – 39 seconds	18 – 32 seconds	4	31 – 51 seconds	20 – 39 seconds
09 – 21 seconds	09 – 17 seconds	3	15 – 30 seconds	08 – 19 seconds
03 – 08 seconds	03 – 08 seconds	2	05 – 14 seconds	02 – 07 seconds
00 – 02 second	00 – 02 second	1	00 – 04 second	00 – 01 second

c. Sit-up test with assessment criteria;

Table 3. Normative data for sit-ups aged 6-9 years & 10-12 years

6 to 9 Years (Sit-Up)		Score	10 to 12 Years (Sit-Up)	
Male	Female		Male	Female
17 and above	15 and above	5	23 and above	20 and above
13-16 times	11-14 times	4	18-22 times	14-19 times
07-12 times	04-10 times	3	12-17 times	07-13 times
02-06 times	02-03 times	2	04-11 times	02-06 times
00-01 times	00-01 times	1	00-03 times	00-01 times

d. Vertical jump with assessment criteria;

Table 4. Normative data for vertical jump aged 6-9 years & 10-12 years

6 to 9 Years (Vertical-Jump)		Score	10 to 12 Years (Vertical-Jump)	
Male	Female		Male	Female
38 and above	38 and above	5	48 and above	42 and above
30-37 cm	30-37 cm	4	38-45 cm	34-41 cm
22-29 cm	22-29 cm	3	31-37 cm	28-33 cm
13-21 cm	13-21 cm	2	24-30 cm	21-27 cm
Under 13 cm	Under 13 cm	1	Under 24 cm	Under 21 cm

e. Short distance running test with assessment criteria;

Table 5. Normative data for short-distance running aged 6-9 years & 10-12 years

6 to 9 Years (Short Distance Running)		Score	10 to 12 Years (Short Distance Running)	
Male (600 m)	Female (600 m)		Male (600 m)	Female (600 m)
Up to 2'39"	Up to 2'53"	5	Up to 2'09"	Up to 2'32"
2'40"-3'00"	2'54"-3'-23"	4	2'10"-2'30"	2'33"-2'54"
3'01"-3'45"	3'24"-4'08"	3	2'31"-2'45"	2'55"-3'28"
3'36"-4'48"	4'09"-5'03"	2	2'46"-3'44"	3'29"-4'22"
Under 4'48"	Under 5'03"	1	Under 3'44"	Under 4'22"

Meanwhile, the physical fitness level categories of the tests that have been given are 5 types of tests which are classified in the following table;

Table 6. Classification of physical fitness levels

	Score Total	Classification
1	22-25	Very Good
2	18-21	Good
3	14-17	Medium
4	10-13	Less
5	05-09	Very Less

The data analysis technique uses the t-test, but the data analyzed must be normally distributed so that the data is first tested for levels of normality and homogeneity. Testing for normality of data distribution uses the Kolmogorov-Smirnov Test and homogeneity testing uses the F-test.

3. FINDINGS AND DISCUSSION

The physical fitness test data that has been obtained is tested first for the level of homogeneity and normality and the research data is declared normal and homogeneous as depicted in the table below;

Table 7. Normality Test Calculation Results

Variable	<i>Hadang Treatment</i>	<i>Bentengan Treatment</i>	α
	<i>Asymp. sig (2-tailed)</i>	<i>Asymp. sig (2-tailed)</i>	
Pre-test Physical Fitness Level	0,527	0,172	> 0,05
<i>Post-test</i> Physical Fitness Level	0,330	0,286	> 0,05

From the table above, the significant values for the pre-test and post-test groups for *Hadang* treatment are 0.527 and 0.330. Likewise, *Bentengan Treatment* has a pre-test and post-test values of 0.172 and 0.286 and is greater than 0.05. So, if the significant value is greater than 0.05 ($\text{Sig} > 0.05$), the hypothesis stating that the sample comes from a normally distributed population is accepted. Thus, it can be concluded that the normality of the distribution is fulfilled, and the results of the homogeneity test conclude that the research data is homogeneous, as shown in Table 8.

Table 8. Homogeneity Test Calculation Results

Variable	<i>Asymp fo Hadang Treatment</i>	<i>Asymp fo Bentengan Treatment</i>	α
Pre-test Physical Fitness Level	2,346	1,523	0,05
<i>Post-test</i> Physical Fitness Level	3,199	2,698	0,05

Table 8 shows that the data on the pre-test and post-test scores for the *Hadang* treatment are homogeneous ($\text{Sig} > 0.05 = 2.346 > 0.05$ and $3.199 > 0.05$), as well as the pre-test and post-test scores for the *Bentengan* treatment show that ($\text{Sig} > 0.05 = 1.523 > 0.05$ and $2.698 > 0.05$) and was declared homogeneous. Thus, the test data can be continued to be tested using the t-test. From each treatment, the t-test results are displayed, and then these two treatments are also analyzed to determine the effect on each variable.

Table 9. T-test results for Game *Hadang* Treatment

Variable	Average	t-account	df	t-table
Pre-test Physical Fitness Level	13.185	29,105	54	1,703
<i>Post-test</i> Physical Fitness Level	16,074	36,898		

The results of the t-test obtained a calculated t-account of 29.105 (pre-test) and 36.898 (post-test) and the t-table with df (0.05)(54) was 1.703. Because the calculated t-account is greater than the t table,

the pre-test physical fitness level is $29.105 > 1.703$ and the post-test physical fitness level is $36.898 > 1.703$, it can be concluded that there is an increase in physical fitness through the *Hadang* game. The average value for pre-test data is 13.185 and the average value for post-test data is 16.074. These results show that the physical fitness level of students at Bangun Harjo State Elementary School after learning the *Hadang* game increased by 2.82/21.4% from the pre-test

Table 10. T-test results for Game *Bentengan* Treatment

Variable	Average	t-account	df	t-table
Pre-test Physical Fitness Level	12.629	21.236	54	1,703
Post-test Physical Fitness Level	14,851	22.895		

The results of the t-test obtained a calculated t-account of 21,236 (Pre-Test) and 22,895 (Post-Test), while the t-table value at df (0.05)(54) was 1.703. Because the calculated t-account is greater than the t table, the pre-test physical fitness level is $21.236 > 1.703$ and the post-test physical fitness level is $22.895 > 1.703$, it can be concluded that there is an increase in physical fitness through playing *Bentengan*. The average for pre-test data is 12.629 and the average for post-test data is 14.851. These results show that the level of physical fitness at Bangun Harjo State Elementary School after learning with the *Bentengan* game increased by 2.22/17.57% from the pre-test.

Thus, each game has a significant influence on students' physical fitness levels. This influence can also be seen from the processing results of the test results for the two types of games in Table 11 below.

Table 11. Results of the Influence of Each Type of Game on Physical Fitness Level

Model	<i>Hadang</i> Game			<i>Bentengan</i> Game			
	R	R Square	Adjusted RSquare	Model	R	R Square	Adjusted RSquare
1	.195 ^a	.038	.000	1	.751 ^a	.565	.547

The R Square value of the traditional game *hadang* is 0.038 so $0.038 \times 100\% = 3.8\%$, meaning it has an influence of 3.8% and the remaining 96.2 is influenced by other factors that were not studied and the RSquare value of the traditional game *bentengan* is $0.565 \times 100\% = 56.5\%$ means it has an influence of 56.5% and the rest is influenced by other factors that were not studied. So, it can be concluded that the traditional game of *hadang* has a smaller influence than the traditional game of *bentengan*. Another factor that influences the application of the *Hadang* and *Bentengan* games in this physical fitness activity is the rules of the game. In the *Hadang* game, students' movements are limited to the designated area, while in the *Bentengan* game, students have free movement.

The findings data stated that the traditional *Bentengan* game has a greater influence on physical fitness than the *Hadang* game. From the results of observations during the treatment process, it can be seen that the *Bentengan* game has made students build agility, running speed and reliable strategies, especially when students have to guard the fort and catch opponents. The agility, running speed and reliable strategies are very good in sprinting, pull-ups, sit-ups, vertical jumps, and short-distance running activities. Meanwhile, the difficulty in the *Hadang* game is that the movements made by students are limited because in this game they are fixated on a rectangular area that must be guarded, so that students' strategies are limited. In the *Hadang* game, students focus on guarding their territorial area to block opponents from passing the line according to the rules that have been determined.

These findings illustrate that the type of games used for physical fitness learning for students in elementary schools is very important and how teachers carry out treatment to use this treatment must also be designed appropriately. Thus, it can be concluded that games are a learning concept that is suitable for elementary school students (Mitchell et al., 2020; Zielinski, 2019). From an educational perspective, games are an integrated part that can be linked to learning experiences and physical activity (Chen, 2013). In other words, games can be used for various physical activities (physical fitness learning). Moreover, many previous studies have applied games to physical activity or learning, such

as games for learning basic biomechanical-based squatting long jump techniques (Defliyanto et al., 2020), and jump box games (Khafidin et al., 2015; Magdalena, 2020). Apart from that, games can provide knowledge and a more enjoyable learning experience (Araújo et al., 2019; Zielinski, 2019). Other research shows that games that involve small movements in the process of learning basic long-jump movements can be effective (Sumantri, 2015).

As previous researchers have done, games create a different learning atmosphere for students. They can learn while experiencing fun activities like they are playing (Chen, 2013). Apart from that, games can also be said to increase students' physical activity (Hassani et al., 2020). Moreover, students in elementary school are of Training to Train age. This period represents a time of skill automation, accuracy, and quality of play. Game activities in learning create competitive situations, both in the form of practice matches and games (Balyi et al., 2013). The results of research related to improving physical fitness illustrate how various movement activities are learned by students through the game steps provided quite well and students also carry out learning activities with pleasure. In other words, the movements that students learn combined with a variety of traditional games provide a fun atmosphere and a different academic atmosphere. Even games have also created good social patterns for students (Awalludin Nugraha et al., 2018). Children play traditional games because they require physical activity and social interaction, which can fulfil their energy needs for movement (Soute et al., 2010).

From these findings and previous research analysis, the use of games in learning activities also teaches various local wisdom values or character education values such as cooperation, collaboration, teamwork, mutual respect, problem-solving to face opponents or passing tests in each physical fitness test activity. These findings certainly recommend that sports teachers use games as an appropriate strategy for teaching physical fitness. Moreover, there are many types of traditional games in Indonesia and students are very familiar with traditional game activities. In other words, using this game will not be difficult to implement in the classroom. The students were able to follow the teacher's instructions in carrying out physical fitness activities and they were also able to perform various movements in the *Hadang* and *Bentengan* games very well. The results of these observations prove that choosing the right type of game provides satisfactory learning results and can achieve the learning objectives set in the syllabus. Thus, the results of this study provide the breadth or enrichment of literature on the application of traditional games to improve the physical fitness of elementary school students.

3 CONCLUSION

The results of the data analysis concluded that the *Hadang* and *Bentengan* games resulted in significant improvements in students' physical fitness, particularly in key areas such as sprinting, pull-ups, sit-ups, vertical jumps, and sprinting activities. However, the traditional *Bentengan* game had a greater effect on sprinting, pull-ups, sit-ups, vertical jumps, and sprinting activities compared to the *Hadang* game. Thus, games are an effective way for students to carry out various physical fitness activities at the elementary school level. The results of this research also have implications for the development of various types of traditional games for other physical fitness learning activities or other health, sports and physical fitness learning activities. The teachers have included this game activity as one of the recommendations that can be developed further.

This research is still limited to testing the influence of two types of traditional games (*Hadang* and *Bentengan*) for physical fitness learning for elementary school students, so the effectiveness of these games for other physical fitness activities or other types of sports is not yet known significantly. Therefore, future research could explore specific types of games or game characteristics that could be particularly beneficial in increasing physical fitness. Apart from that, the results of this research can also be developed by combining the traditional games *Hadang* and *Bentengan* with modern games to test the physical fitness level of elementary school students. Teachers can also research the same topic to develop their professional performance in physical fitness learning. Schools can provide various training related to developing strategies or learning media for teachers in the fields of physical

education, health and sports so that their teaching activities are of higher quality meet the demands of the current era of globalization and can be by the use of the Merdeka curriculum that has been used by the government Indonesia at school.

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