

## The Effect of Daily Physical Activity on Increasing Physical Fitness and Academic Achievement of Elementary School

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### Abstract

*Theoretically, physical activity can improve physical fitness and cognitive functions. Students who do regular physical activity are expected to have fitness and fitness at the same time as their cognitive function grows and develops so that their academic achievement increases. Unfortunately, as technology advances and lifestyle changes, children's physical activity is decreasing. Effectiveness in achieving learning objectives continuously along with the level of student fitness and decreased cognitive function improvement. This study aims to examine the effect of daily physical activity on increasing students' fitness and academic achievement. The research method used is quasi-experimental with a matching-only design. As a sample, 30 grade 5 students of SDN Pesanggrahan I, Kwanyar, Bangkalan. The sample was divided into two groups, 15 students in the experimental group and 15 students in the control group. The treatment was given for 8 weeks with 3 meetings per week. The fitness variable was measured by a multistage fitness test, meanwhile, the academic achievement variable was measured by a series of questions prepared by the teacher. Data processing was carried out by analysis of covariance (ANCOVA) using the results of the pretest as covariates. The results showed that daily physical activity could improve physical fitness ( $F=45.91$ ;  $p<0.01$ ) and student academic achievement ( $F=7.72$ ;  $p<0.01$ ). The experimental group showed better physical fitness than the control group ( $F=100.91$ ;  $p<0.01$ ). The experimental group also showed better academic achievement than the control group ( $F=19.45$ ;  $p<0.01$ ). Based on the results of the analysis, it can be said that the application of daily physical activity for 2 months is proven to be effective in improving physical fitness and academic achievement of fifth-grade students at SDN Pesanggrahan I, Kwanyar, Bangkalan.*

### Keywords

daily physical activity;  
physical fitness;  
academic  
achievement



## I. Introduction

At a time when technological advances are developing very quickly, with the creation of several applications or software, making it easier for someone to carry out daily activities without doing significant activities. However, from the rapid development of technology, there are negative effects such as the emergence of applications that focus on community games to spend more time just playing games.

The activity of playing these games greatly affects a person's level of fitness because free time is usually used for physical activities such as playing traditional games for elementary school students and exercising for junior and senior high school students.

According to the Law of the Republic of Indonesia, Number 20 (2003, p. 6) concerning the national education system, the purpose of national education is to develop the potential of students to become human beings who believe and fear God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen.

From the elaboration of the Law of the Republic of Indonesia number 20 of 2003 and physical education, sports and health, namely an education that utilizes physical activities and one of them aims at physical fitness. However, the results of research by Maksum (2018, p. 5) data on the level of physical fitness of students from 1995-2011, the level of physical fitness of students is decreasing.

According to WHO (in Maksum, 2018, p. 2), the biggest cause of death in Indonesia is a cardiovascular disease with a percentage of 37%, in other words, the Indonesian population lacks physical activity. Meanwhile, WHO recommends a minimum of time spent on physical activity, which is 150 per week with moderate intensity and each exercise is at least 30 minutes.

Physical fitness will be achieved if a person is routine and diligent in carrying out physical activities, this activity must be carried out since children enter the school environment from elementary, junior high, and high levels. This can be done by implementing daily physical activity, the implementation of which will be prepared and planned by physical education, sports, and health teachers.

In the Regulation of the Minister of Education and Culture Number 68 of 2013) the 2013 curriculum aims to prepare Indonesian people to have the ability to live as individuals and citizens who are faithful, productive, creative, innovative, and effective, and able to contribute to the life of society, nation, state, and society. world. To be able to realize these goals, a teacher must be able to improve the physical fitness of students, so that students in the learning process can concentrate well when receiving material from the teacher. Both PJOK learning and classroom learning.

According to Powers & Dodd (2020, p. 6), physical activity, in general, has several benefits that include health and psychological aspects such as reducing the risk of cardiovascular disease, cancer, diabetes, and increasing psychological abilities. This proves that physical fitness is a very important role in everyday life, especially for students so that it is easier to understand lessons at school. Physical activity is an inseparable part of the life of living things, ranging from simple to very complex activities (Sulaiman, 2020).

This is reinforced by Hillman et al (in Du Toit et al., 2011, p. 23) who stated that aerobic fitness has a positive relationship with specific cognitive functions such as attention and memory in children and pre-adolescents. while Schott and Liebig (in Du Toit et al., 2011, p. 23) found the cognitive function to be an important predictor of physical fitness in German children aged 8 to 16 years.

Meanwhile, physical education, sports, and health lessons are only carried out once a week, with a very limited time a teacher will find it difficult to achieve learning goals. So it takes additional time and additional physical activity to achieve the learning objectives of physical education, sports, and health. Socializing sports in today's era is not as easy as turning your hand. Physical education as part of sports has not been able to fulfill its role until now (Arsani, 2020).

Fitness level is closely related to academic achievement so students must be in a fit state, this is according to the results of Basch's research (2011, p. 626) among adolescents who are in urban areas with less physical activity levels, have poor cognitive abilities that harm academic achievement.

So schools must make students more active in physical activities both individually and in nature, because students' interest in activities can be influenced by the environment, is by the results of the study by Sawka et al., (2013,p. 1) stating the level of activity that friends influence on. Significant at the individual activity level, this is based on a public health intervention utilizing peer influence to increase physical activity among children and adolescents.

## II. Research Methods

This study uses a quantitative approach and a quasi-experimental design with a matching-only design method.

M	T <sub>1</sub>	X	T <sub>2</sub>
M	T <sub>1</sub>	~	T <sub>2</sub>

**Figure 1. Research Design**

Source: Maksum (2018)

- A. Independent variable: daily physical activity.
- B. Dependent variable: Physical fitness and academic achievement.

This research was conducted at SDN Pesangrahan I for 2 months or 8 weeks, the test and measurement tools used were multistage fitness test (MFT) to measure physical fitness while academic achievement used cognitive tests in the form of multiple choice.

The data analysis used were descriptive statistics, normality test, homogeneity test, ANCOVA (analysis of covariance), and analysis with the help of a computer program SPSS (Statistical Program For Social Science) 23.0.

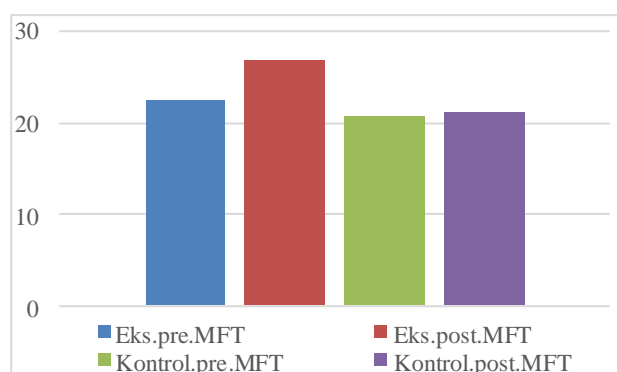
## III. Discussion

The following are the results of research data obtained by conducting tests and measurements on students' physical fitness and academic achievement, data analysis with the help of SPSS 23.0

### 3.1 Physical Fitness Test Results and Measurements

Physical fitness tests and measurements using a multistage fitness test (MFT) the data obtained include the average (mean), maximum and minimum values in the experimental and control groups as follows:

1. The results of the average physical fitness of students in the experimental group got a score of 22.35 mL/kg/min pre-test and post-test 26.84 mL/kg/min while the results of the average fitness of students in the control group got a score of 20.58 mL/ kg/min pre-test and post-test 21.19 mL/kg/min.
2. The highest result of physical fitness of students in the experimental group got a score of 26.40 mL/kg/min pre-test and post-test 30.60 mL/kg/min while the highest result of student fitness in the control group got a score of 23.40 mL/kg/min pre-test and posttest 24.00 mL/kg/min.
3. The lowest result of students' physical fitness in the experimental group got a score of 18.50 mL/kg/min pre-test and post-test 22.60 mL/kg/min while the lowest score of students in the control group got a score of 18.50 mL/kg/min pre-test and post-test 19.60 mL/kg/min.

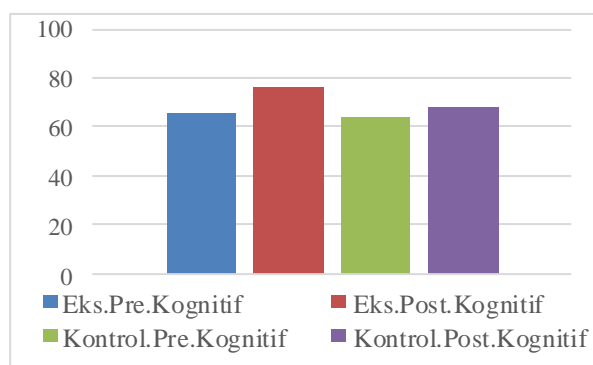


**Figure 2.** Changes in Physical Fitness Score on Pre-test and Post-test

### 3.2 Test Results and Measurement of Academic Achievement

Tests and measurements of academic achievement using cognitive tests with multiple-choice models, the data obtained include the average (mean), maximum and minimum values in the experimental and control groups as follows:

1. The results of the average academic achievement of students in the experimental group got a score of 65.61 pre-test and post-test 76.48 while the results of the average academic achievement of students in the control group got a score of 63.65 pre-test and post-test 68.49.
2. The results of the highest academic achievement of students in the experimental group got a score of 75.00 pre-test and post-test 82.67 while the highest academic achievement in the control group got a score of 72.33 pre-test and post-test 79.67.
3. The lowest result of academic achievement of students in the experimental group got a score of 60.17 pre-test and post-test 68.50 while the lowest score of academic achievement in the control group got a score of 53.00 pre-test and post-test 60.20.



**Figure 3.** Changes in Academic Achievement Score on Pre-test and Post-test

### 3.3 Normality Test

The normality test is one of the prerequisites for testing the hypothesis, the normality test aims to ensure that the data obtained are normally distributed. In the normality test, there are provisions: if the p-value is greater than 0.05 then it is declared normally distributed, but if the p-value is less than 0.05 then it is declared not normally distributed. The following are the results of the normality test on the data obtained from the research conducted.

**Table 1.** The Results of the Normality Test

	Kelompok	Shapiro-wils			
		Statistic	df	Sig.	Ket.

Pre.MFT	Eksperimen	.916	15	.166	Normal
	Kontrol	.937	15	.349	Normal
Post.MFT	Eksperimen	.921	15	.197	Normal
	Kontrol	.882	15	.051	Normal
Pre. Kognitif	Eksperimen	.918	15	.179	Normal
	Kontrol	.967	15	.815	Normal
Post. Kognitif	Eksperimen	.938	15	.984	Normal
	Kontrol	.961	15	.716	Normal

Based on the table above, all groups have a p-value greater than 0.05, all groups have data that are normally distributed.

### 3.4 Homogeneity Test

The homogeneity test is a prerequisite test that will then be carried out which aims to ensure that the variance of each group or similar so that comparisons can be made fairly. In the normality test, some provisions apply as follows: if the p-value is greater than 0.05 then it is declared homogeneous, but if the p-value is less than 0.05 then it is declared not homogeneous. The following are the results of the homogeneity test on the data obtained from the research conducted.

**Table 2.** The Homogeneity Test

Levene's Test		df1	df2	Sig.	Keterangan
MFT	2.193	1	28	0,150	homogen
Kognitif	2.034	1	28	0,165	homogen

Based on the table above, all groups have a p-value greater than 0.05, this all groups have homogeneous data.

### 3.5 Hypothesis Test

The treatment effect test in this study used covariance statistical techniques, but in the analysis of covariance, statistically controlled (control) was added to numerical variables. Variables are entered as covariates to reduce the error variance by eliminating the influence of these variables and in covariance in this study using pre-test values. The error rate used is 5%, the conclusion is based on the sig value. less than 0.05. The following table shows the results of the analysis of covariance.

#### a. Physical Fitness Covariance Analysis

**Table 3.** Test of Between-Subjects Effects

Tests of Between-Subjects Effects					
Dependent Variable: Post.MFT					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	291.016 <sup>a</sup>	2	145.508	130.184	.000
Intercept	12.977	1	12.977	11.610	.002
Pre.MFT	51.315	1	51.315	45.911	.000
Kelompok	112.792	1	112.792	100.913	.000
Error	30.178	27	1.118		
Total	17620.400	30			
Corrected Total	321.195	29			
a. R Squared = .906 (Adjusted R Squared = .899)					

From the table above, it can be seen that the coefficient value (F) is 45.911 and the significant number for pre-MFT (covariance) is  $0.000 < 0.05$ , it can be said that there is a statistically significant difference between pre-MFT (covariance) on physical fitness. From the results of a significance of 0.000, it shows that there is a statistically significant effect between daily physical activity on the level of physical fitness of students.

Based on the table above, the coefficient value (F) is 100.913 and the group significance number is sig.  $0.000 < 0.05$ . So, there was a significant difference in physical fitness between the group that got daily physical activity (experimental) and the group that did not get daily physical activity (control).

**Table 4. Parameter Estimates**

Parameter Estimates						
Dependent Variable: Post.MFT						
Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	5.883	2.275	2.586	.015	1.215	10.551
Pre.MFT	.744	.110	6.776	.000	.518	.969
[Kelompok=1]	4.340	.432	10.046	.000	3.453	5.226
[Kelompok=2]	0 <sup>a</sup>	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

In the table above, the group significance value =  $0.000 < 0.05$  so it can be concluded that daily physical activity is effective for improving physical fitness.

## b. Academic Achievement Covariance Analysis

**Table 5. Tests of Between-Subjects Effects**

Tests of Between-Subjects Effects					
Dependent Variable: Post.Kognitif					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	622.264 <sup>a</sup>	2	311.132	16.674	.000
Intercept	310.854	1	310.854	16.659	.000
Pre.Kognitif	144.022	1	144.022	7.718	.010
Kelompok	362.994	1	362.994	19.453	.000
Error	503.824	27	18.660		
Total	158741.096	30			
Corrected Total	1126.087	29			

a. R Squared = .553 (Adjusted R Squared = .519)

From the table above, it can be seen that the coefficient value (F) is 7.718 and the significance number for pre-cognitive (covariance) is  $0.01 < 0.05$ , so it can be said that there is a statistically significant difference between pre-cognitive (covariance) on achievement academic. From the results of sig. 0.000 indicates that there is a statistically significant effect between daily physical activity on students' academic achievement.

Based on the table above, the coefficient value (F) is 19.453 and the group significance number is sig.  $0.000 < 0.05$ . So, there is a significant difference in academic



achievement between the group that gets daily physical activity (experimental) and the group that does not get daily physical activity (control).

**Table 6. Parameter Estimates**

Parameter Estimates						
Dependent Variable: Post Kognitif						
Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	39.627	10.449	3.792	.001	18.187	61.067
Pre.Kognitif	.453	.163	2.778	.010	.119	.788
[Kelompok=1]	7.098	1.609	4.411	.000	3.796	10.400
[Kelompok=2]	0 <sup>a</sup>	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

In the table above, the group's significance value is  $0.000 < 0.05$ , so it can be concluded that daily physical activity is effective for improving academic achievement.

## IV. Conclusion

Based on the analysis of data processed with SPSS, there is a significant effect between daily physical activity on physical fitness as indicated by a significance value of 0.000 and the coefficient value (f) is 45.911. This is evidence that daily physical activity affects students' physical fitness. Furthermore, it is proven by the average value of physical fitness in the experimental group which shows the post-test value is higher than the pre-test value.

The results of this study obtained a sig value of 0.000 and the coefficient value (f) was 100.913 which indicated that there was a significant difference in physical fitness between the group that received daily physical activity (experimental) and the group that did not get daily physical activity (control). The average value in the experimental group (26.84) was higher than the control group (21.18). Based on the average value of the pre-test and post-test the experimental group experienced an increase of 20.1%

The results of the SPSS calculation above are directly proportional to the results of the study from Skogstad et al., (2016, p.1) which states that exercise is performed 2-3 times or 4 times a week and carried out consecutively for 8 weeks can improve physical fitness. VO2max) and cholesterol and LDL levels.

Meanwhile, the post-test average value of academic achievement in the experimental group got a higher score than the average pre-test score, this indicates an increase in students' academic achievement. In addition, the results of data processing using SPSS, there is a statistically significant effect with a significance value of 0.010 and the coefficient value (f) is 7.718 for daily physical activity on academic achievement.

The results of this study also obtained the value of sig. 0.000 and the coefficient value (f) is 19.45 which indicates that there is a significant difference in academic achievement between the group that gets daily physical activity (experimental) and the group that does not get daily physical activity (control). The average value in the experimental group (76.47) was higher than the control group (68.49), based on the average value of the pre-test and post-test of the experimental group, which increased by 16.56%. An increase in academic achievement occurred in both groups, an increase in the experimental group occurred in all students, this occurred because of the influence of daily physical activity carried out by students in the experimental group which provided an

increase in physical fitness. While the control group only occurred in a few students, the increase in these students was due to the influence of parenting patterns and student motivation in learning.

The results of the analysis above are supported by the results of research by Lvarez-Bueno et al., (2017, p. 11) the application of physical activity interventions carried out in schools can have a significant influence on academic achievement, besides that the promotion of physical activity is an effective means for children's physical health. mentally. strengthened by the results of research by Aadland et al., (2017, p. 21) that comprehensive physical activity to improve physical fitness and motor skills can positively affect executive function and academic performance.

The conclusion that can be drawn from this study is that the intervention of daily physical activity for 2 months has a significant effect on increasing physical fitness and learning achievement of elementary school students.

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