

Physical Activity and Physical Fitness as Predictors of Students' Physical Education Learning Achievement



Muhammad Wigi Saputra¹, Soni Nopembri², Afeb Chesa Arianto³, Ujang Nurdin⁴

^{1,2,3,4} Department of Sport Science, Yogyakarta State University, Yogyakarta Indonesia

ABSTRACT: This study aims to analyze the relationship between physical activity and physical fitness with students' Physical Education learning achievement both partially and simultaneously. This type of research is quantitative with a correlational approach. The population in the study were junior high school students in Yogyakarta, totaling 125 students. The physical activity instrument is The Physical Activity Questionnaire for Adolescent (PAQ-A) which has been modified. Physical fitness level was measured using the Indonesian Physical Fitness Test for children aged 13-15 years. Learning achievement is based on report card scores. The data analysis technique used is a prerequisite test consisting of normality test, linearity test, while the hypothesis test uses partial and simultaneous tests. The results showed that (1) There is a significant relationship between physical activity and students' Physical Education learning achievement. (2) There is a significant relationship between physical fitness and Physical Education learning achievement of class students. (3) There is a significant relationship between physical activity and physical fitness with students' physical education learning achievement.

KEYWORDS: Physical Activity, Physical Fitness, Physical Education Learning Achievement

INTRODUCTION

Physical Education is an integral part of overall education that has the aim to develop aspects of movement skills, aspects of physical fitness, aspects of healthy lifestyles, aspects of social skills, aspects of critical thinking skills, aspects of emotional stability, aspects of reasoning, aspects of moral action, and aspects of clean environment recognition. Physical Education is useful for students in providing opportunities to engage in sports directly, thus creating new experiences that are more useful for students (Chu & Zhang, 2018). Physical Education aims to develop learners' motivation to exercise and physical activity in fulfilling basic psychological needs (Fin et al., 2017). Moreover, it can be useful for other education including the development of social skills, self-confidence, and behavioral perseverance. The end result of learning is expressed in the form of learning achievement scores.

Learner learning outcomes are essentially changes in behavior. Behavior as a result of learning in a broad sense includes cognitive, affective, and psychomotor fields. Learning achievement can be influenced by psychological, economic, social, individual, and environmental factors. Individuals in this case are physically and mentally healthy. Physical activity is any body movement produced by skeletal muscles that requires energy expenditure. Physical activity includes any motor behavior in daily and recreational activities. Structured physical activity can increase blood flow to the brain so that nutrients and oxygen can be channeled properly (Houdebine et al., 2017). Lack of oxygen to the brain results in disorientation, fatigue, impaired concentration, confusion, and memory problems. Good physical activity results in not reaching a state of homeostasis, a balance of nutrients and brain chemicals that allows the brain to be ready to analyze and learn (Stern et al., 2019).

Physical fitness is a very important potential in supporting daily activities without feeling excessive fatigue and even being able to do activities afterwards. Through physical activities that are directed and carried out continuously, it will produce the impact of physical fitness and health (Singh & Bhatti, 2020). Physical fitness is the result of the work of the body system functions that realize the improvement of the quality of life in every activity that involves physical. If a person's physical fitness is low, it will be very easy to fatigue, thus not maximizing brain function in thinking. Physical fitness in learning activities plays an important role, if the physical fitness of students is not good, it will have an impact on their learning activities which in turn will affect their learning outcomes (Tucker et al., 2017). Students who have poor physical fitness will experience difficulties in their learning activities (Gu et al., 2016). If physical fitness is well maintained, then the learning process carried out will be maximized, from a good learning process will produce brilliant academic achievement.

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Results of the study (Han, 2018) indicates that intense physical activity promotes brain changes seen with increased oxygenation and tissue, as well as increased metabolic activity and provides improved neurological development. The cycle indicates that physical activity is a determining factor in academic achievement. The study was conducted by (Gil-Espinosa et al., 2020) which examined physical fitness and its relationship with academic achievement. The results showed that cardiorespiratory fitness, muscle strength and flexibility were positively associated with academic achievement, except muscle strength, which was not significantly associated with Spanish or math. Overall, cardiorespiratory fitness was positively associated with intelligence and academic achievement. Study conducted (Han, 2018) found that students with good physical fitness levels tend to have good average scores in subjects with higher levels of complexity such as English, math, and science. In accordance with the formulation of the problem above, the aim to be achieved in this study is to determine the relationship between physical activity and physical fitness with students' physical education learning achievement.

METHOD

This type of research is descriptive quantitative with a correlational approach. Correlation research is research that aims to find whether or not there is a relationship and if so, how close the relationship is, and whether or not the relationship is meaningful. The population in the study was junior high school students in Yogyakarta, totaling 125 students. The physical activity instrument is The Physical Activity Questionnaire for Adolescent (PAQ-A) which has been modified. Physical fitness level was measured using the Indonesian Physical Fitness Test for children aged 13-15 years. Learning achievement is based on report card scores. The data analysis technique used is a prerequisite test consisting of normality test, linearity test, while the hypothesis test uses partial and simultaneous tests. The analysis was conducted using SPSS 23.0 for windows.

RESULTS

The results of descriptive analysis are aimed at knowing physical activity, physical fitness, and physical education learning achievement. Descriptive statistical results based on mean and standard deviation in Table 1.

Table 1. Descriptive Statistics

No.	Variables	Statistics
1	Physical Activities	2.03 ± 0.63
2	Physical fitness	12.98 ± 1.84
3	Physical Education learning achievement	77.86 ± 4.00

The data normality test in this study used the Kolmogorov-Smirnov method. The results of the data normality test carried out on each analysis group were carried out with the SPSS version 23.0 for windows software program with a significance level of 5% or 0.05. The data summary is presented in Table 2.

Table 2. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		125
Normal Parameters ^a	Mean	0.0000000
	Std. Deviation	2.79721049
Most Extreme Differences	Absolute	0.083
	Positive	0.083
	Negative	-0.037
Kolmogorov-Smirnov Z		0.929
Asymp. Sig. (2-tailed)		0.354
a. Test distribution is Normal.		

Based on the statistical analysis of the normality test that has been carried out using the Kolmogorov-Smirnov test in Table 2, the variables of physical activity, physical fitness, and Physical Education learning achievement obtained normality test results with p-value > 0.05, which means that the data is normally distributed..

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Testing the linearity of the relationship is done through the F test. The relationship between the independent variable (X) and the dependent variable (Y) is declared linear if the p-value > 0.05. The results of the linearity test can be seen in Table 3.

Table 3. Linearity Test Results

No.	Functional Relationship	p	Sig.	Description
1	Physical activity * Physical Education learning achievement	0.375	0.05	Linear
2	Physical fitness * Physical Education learning achievement	0.115	0.05	Linear

Based on the results of the analysis in Table 3 above, it can be seen that the relationship between physical activity and Physical Education learning achievement obtained a p-value of $0.375 > 0.05$ and the relationship between physical fitness and Physical Education learning achievement obtained a p-value of $0.115 > 0.05$ is declared linear..

Regression analysis is a statistical technique useful for examining and modeling the relationship between variables. The results of multiple linear analysis of the relationship between physical activity and physical fitness of students are presented in table 4 as follows:

Table 4. Multiple Linear Regression Analysis Results

Model		Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta
1	(Constant)	63.199	1.865	
	Physical activity (X ₁)	3.040	0.529	0.481
	Physical fitness (X ₂)	0.653	0.182	0.300

Based on table 4 above, the multiple linear regression equation resulting from this study can be determined as follows:

$$\text{Physical Education Learning Achievement (Y)} = 63.199 + 3.040 \text{ Physical activity (X}_1\text{)} + 0.653 \text{ Physical fitness (X}_2\text{)}$$

Based on the results of the multiple linear equation above, it can be interpreted as follows:

The constant is 63,199 which means that if the physical activity and physical fitness variables are considered zero, then the Physical Education learning achievement variable is only 63,199. The regression coefficient of the physical activity variable obtained a value of 3.040 which means that if the physical activity variable increases, while the physical fitness variable is assumed to be fixed, then the Physical Education learning achievement will increase by 3.040. The regression coefficient of the physical fitness variable obtained a value of 0.653, which means that if the physical fitness variable increases, while the physical activity and sleep quality variables are assumed to be fixed, then Physical Education learning achievement will increase by 0.653. Furthermore, hypothesis analysis was carried out, namely partial tests and simultaneous tests. The t test (partial) was conducted to determine the effect of each independent variable, namely physical activity and physical fitness on Physical Education learning achievement. The results of the t test (partial) analysis are presented in Table 5 as follows.

Table 5. Partial Test Analysis Results (t test)

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	63.199	1.865		33.888	.000
	Physical activity	3.040	.529	.481	5.749	.000
	Physical fitness	.653	.182	.300	3.586	.000

a. Dependent Variable: Prestasi belajar Pendidikan Jasmani

The physical activity variable obtained a p-value of 0.000. Because the p-value of $0.000 < 0.05$, then H₀ is rejected, meaning that H₁ which reads "There is a significant relationship between physical activity and Physical Education learning achievement" is accepted. The value is positive, meaning that if physical activity is getting better, then Physical Education learning achievement will also be better.

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Physical fitness variable obtained p-value 0.000. Because the p-value of $0.000 < 0.05$, then H_0 is rejected, meaning that H_2 which reads "There is a significant relationship between physical fitness and Physical Education learning achievement" is accepted. The value is positive, meaning that if physical fitness is getting better, then Physical Education learning achievement will also get better.

The F test is used to test the hypothesis whether the independent variables together (simultaneously) affect the dependent variable. H_3 reads "There is a significant influence between physical activity and physical fitness on Physical Education learning achievement". The results of the analysis in Table 6.

Table 6. F Test Analysis Results (Simultaneous)

ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1014.184	2	507.092	63.764	.000 ^a
	Residual	970.224	122	7.953		
	Total	1984.408	124			
a. Predictors: (Constant). Physical fitness. Physical activity						
b. Dependent Variable: Physical Education learning achievement						

Based on Table 6 above, the calculated F coefficient is 63.764 and the p-value is $0.000 < 0.05$, then H_0 is rejected, meaning. The alternative hypothesis which reads "There is a significant relationship between physical activity and physical fitness on Physical Education learning achievement", is accepted. It can be concluded that the regression model chosen is suitable for testing data and the regression model can be used to predict that physical activity and physical fitness as predictors of students' Physical Education learning achievement.

The Coefficient of Determination is essentially used to measure how far the ability of the regression model to explain the variation in the dependent variable. The analysis results in Table 7 are as follows.

Table 7. Coefficient of Determination Analysis Results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.715 ^a	0.511	0.503	2.82005
Predictors: (Constant), physical activity, physical fitness				

The coefficient of determination or physical activity and physical fitness in explaining or predicting the Physical Education learning achievement variable is 0.511 or 51.10%. This means that the physical activity and physical fitness variables have an influence on Physical Education learning achievement of 51.10%, while the rest is influenced by other factors of 48.90% outside this study.

DISCUSSION

Based on the results of the study, it shows that there is a significant relationship between physical activity and students' Physical Education learning achievement. Physical activity is any body movement produced by the contraction of several muscles that increases energy demand above the resting metabolic rate and is characterized by modality, frequency, intensity, duration, and context of practice. The relationship between physical activity and cognitive domain and academic achievement in children and adolescents due to the neurocognitive effects of physical activity in children and adolescents has important implications for public health and education that can be obtained through Physical Education in the school curriculum (Thivel et al., 2018). In addition to positive effects on physical health, it can also have positive effects such as cognitive, social and emotional domains. Physical Education in schools may have a positive effect on academic achievement. However, schools face increasing challenges in allocating time for sport and physical activity during the school years. Physical activity that is rarely done and results in a low level of physical fitness results in not maximizing the nutrients and oxygen flowing to the brain which results in students not being ready to carry out the teaching and learning process, so that the achievement of learning achievement is not maximized either, because physical activity plays a very important role in supporting the achievement of student learning outcomes (Alvarez-Bueno et al., 2017; Nayak, 2018).

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Structured physical activity can increase blood flow to the brain so that nutrients and oxygen are properly delivered. Lack of oxygen to the brain results in disorientation, fatigue, impaired concentration, confusion, and memory problems. Good physical activity results in not reaching a state of homeostasis, a balance of nutrients and brain chemicals that allows the brain to be ready to analyze and learn (Stern et al., 2019). Separate from its effects on health increased physical activity produces major academic benefits by improving cognition, focus, and memory (Packham & Street, 2019)

Based on the results of the study, it shows that there is a significant relationship between physical fitness and students' Physical Education learning achievement. This is very likely to happen because the level of physical fitness can support a person's performance to move both physically and in the thinking process (McPherson et al., 2018). If a person's physical fitness is low, it will be very easy to fatigue, thus not maximizing brain function in thinking. The level of physical fitness in learning activities plays an important role, if the physical fitness of students is not good, it will have an impact on their learning activities which will ultimately affect their learning outcomes. Learners who have poor physical fitness, will experience difficulties in their learning activities (Gu et al., 2016). If physical fitness is well maintained, the learning process carried out will be maximized, from a good learning process will produce good academic achievement.

Based on the results of the study, it shows that there is a significant relationship between physical activity and physical fitness with Physical Education learning achievement. Physical Education learning achievement results are the value of learning outcomes expressed in the form of symbols, letters, numbers, or sentences that can reflect the learning outcomes that have been achieved by each child in carrying out learning activities at certain periods. Learning outcomes are one measure of the ability of students to understand lessons, especially Physical Education. Academic achievement can be influenced by psychological, economic, social, individual, and environmental factors. Individuals in this case are physically and mentally healthy. These individual factors can also be influenced by health. Physical activity and physical fitness can be a support that can be done daily for good health, so that it can support the running of the education process which will have a good impact on academic achievement.

Physical fitness is a very important potential in supporting daily activities without feeling excessive fatigue and even being able to do activities afterwards. Through physical activities that are directed and carried out continuously, it will produce the impact of physical fitness and health. Intense physical activity and exercise will be directly proportional to the level of physical fitness. In addition, doing activities that involve physical or exercise will affect the physical ability to maximize oxygen processed in the body. If the body has the ability to maximize oxygen consumption and is able to meet good nutrition or nutrition, it will have a significant impact on physical fitness.

CONCLUSION

Based on the results of data analysis, description, testing of research results, and discussion, it can be concluded that: (1) There is a significant relationship between physical activity and students' Physical Education learning achievement. (2) There is a significant relationship between physical fitness and students' Physical Education learning achievement. (3) There is a significant relationship between physical activity and physical fitness with students' Physical Education learning achievement. For teachers if they want their students to get good learning achievements, always in providing learning materials to be improved and encourage students to study harder. For further researchers, it is hoped that other independent variables can be added, so that the variables that affect the learning achievement of Physical Education Sports Health can be identified even more and the results can be generalized.

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