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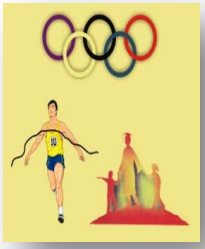

The Relationship between Physical Activity, BMI, Physical Fitness, and Learning Achievement of Class X Students of SMKN 2 Malang

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Abstract

Learning achievement is the responsibility of teachers and the government, therefore everything that can encourage learning achievement must be considered and improved. Physical activity, BMI, physical fitness are several factors that influence learning achievement. The aim of this research is to determine the level of relationship between physical activity, BMI, and fitness and the learning achievement of class X students at SMKN 2 Malang. The research method used is a survey research method with a correlational research type. To determine the sample size, the researcher used the Slovin formula with an error rate of 10% with a class X student population of 656 students, so the sample size was 89 students. Because class X students are divided into 19 classes and so that each class has the same opportunities, the author uses the Proportional Random Sampling technique. IPAQ-SF to measure physical activity, IMT/U to measure BMI, and TKSI to measure physical fitness. The research results showed that physical activity was not significantly related to learning achievement with a P-Value of 0.809 > 0.05. BMI is not significantly related to learning achievement with P-Value 0.194 > 0.05. Physical fitness does not have a significant relationship with learning achievement, P-Value 0.893 > 0.05.

Keywords: Relationship; Physical Activity; BMI; Physical Fitness; Learning achievement.

INTRODUCTION

In the realm of education, academic achievement stands as a collective responsibility shared among teachers, government bodies, and various stakeholders (Fajaruddin, 2016; Sulastio, 2016). Enhancing learning outcomes involves considering and improving upon numerous factors, including physical activity, body mass index (BMI), and physical fitness. Previous research has shown significant interest in understanding how these aspects can influence students' academic performance. However, there remains no definitive consensus on the extent to which each factor contributes to academic achievement within the context of secondary education.

This study aims to investigate the relationship between physical activity, BMI, and physical fitness with the learning achievement of tenth-grade students at SMKN 2 Malang. Understanding these relationships is crucial as they potentially impact students' overall educational attainment and well-being. By exploring these variables, educators and policymakers can gain insights into effective strategies to support academic success and promote holistic student development (Astuti et al., 2020).

In recent years, there has been an increase in concerns about the health and well-being of students, as sedentary lifestyles and poor diets have become increasingly common, contributing to rising rates of obesity and related health problems. The Body Mass Index (BMI), which is a measure of body fat based on height and weight, has emerged as a leading indicator of overall health status, particularly among adolescents and young adults. In addition to BMI, the level of physical activity and physical fitness also receives attention because of its great impact on physical and cognitive development.

BMI is a calculation tool used to assess health from weight and height Smolin dkk (2022). BMI has been widely used to assess children's health and well-being. Research consistently shows that higher BMI is associated with decreased physical fitness and an increased risk of chronic diseases such as diabetes and heart disease. Physical activity, on the other hand, has been recognized as an essential component of a healthy lifestyle. Regular physical activity is associated with improved physical fitness, a reduced risk of chronic disease, and improved cognitive function. Physical activity consists of every body movement produced by skeletal muscles that results in a substantial increase in resting energy expenditure (Bouchard dkk., 2022). Physical activity that is done regularly and regularly will improve a person's physical fitness. Systematic sports activities over a long-term, progressive and individual period of time aim to shape human physiological and psychological functions to fulfill the required tasks (Bompa & Haff, 2009). Physical fitness which includes aspects such as cardiorespiratory endurance, muscle strength, and flexibility is another important factor in the relationship between BMI, physical activity, and student learning achievement. Physical fitness has been linked to improved academic performance, a reduced risk of chronic disease, and improved overall health and well-being. Physical fitness is the ability to perform aspects of sports or Physical fitness is the body's ability to function efficiently and effectively in work and leisure activities, to be healthy, to fight hypokinetic diseases, and to deal with emergency situations (Powell, 2011)

Many factors affect a student's academic achievement, including socioeconomic status, family and school background as well as some personal factors namely physical and mental status (Mishra, 2023). Physical health is one of the key factors that affect academic performance. These health include Nutrition (BMI), physical activity, and physical fitness (Morales, 2018). Poor child health can result in children experiencing psychosocial and academic difficulties (Salkin, 2008). This opinion is supported by the results of research from González-Fernández, dkk (2023) and Hafsah dkk (2018) yang menunjukkan bahwa semakin baik kebugaran jasmani, semakin kecil kesalahan kelalaian yang This indicates that the better the physical fitness of eating, the greater the likelihood of students obtaining good academic achievements. Results Shi dkk, (2022) shows that students with high BMI tend to have worse academic ability, this shows that BMI has a relationship with learning achievement which is characterized by the greater the BMI, the worse the academic ability will be and vice versa. Results Komarudin dkk, (2023) and Liu dkk (2023) which states that physical activity has a significant positive influence on academic achievement. Regular physical activity can improve cognitive skills, improve concentration and attention, encourage better classroom behavior, and improve academic performance.

The study of the relationship between physical activity, BMI, physical fitness, and academic achievement is rooted in a growing body of literature that explores the multifaceted nature of student performance. Prior research has indicated that physical activity can enhance cognitive function, potentially leading to better academic outcomes. For instance, studies have suggested that regular physical activity can improve concentration, memory, and classroom behavior, all of which are crucial for academic success. Similarly, physical fitness has been linked to better cognitive functioning and brain health, which may translate to improved learning outcomes. Despite these findings, the direct impact of physical activity and fitness on academic achievement remains inconclusive, with some studies reporting weak or insignificant correlations.

The role of BMI in academic performance has also been explored, albeit with mixed results. While some studies suggest that students with a normal BMI tend to perform better academically due to better health and reduced absenteeism, others find no significant relationship between BMI and academic achievement. The lack of consistent findings across different contexts and populations highlights the complexity of the factors influencing academic performance. This study seeks to contribute to the existing literature by examining these relationships in the specific context of tenth-grade students at SMKN 2 Malang, thereby adding to the ongoing discourse on the interplay between physical health and academic success.

Given the magnitude of the influence of BMI, physical activity, and physical fitness on student learning achievement, it is important to know the relationship between these factors. This study aims to determine the relationship between BMI, physical activity, physical fitness, and learning achievement

of grade X students of SMKN 2 Malang. The findings of this study will provide valuable insights into the importance of adding an understanding of BMI, physical activity, and physical fitness into educational programs to improve student learning achievement and overall health and well-being.

METHOD

The research method used is a survey research method with a type of correlational research. This method emphasizes the relationship between two or more variables (Radjab & Jam'an, 2017). This study was conducted to identify the relationship between the independent variables X1 physical activity, X2 BMI, X3 physical fitness and tied (Y) learning achievement of grade X students at SMKN 2 Malang. The determination of the number of samples in this study is using the Slovin formula with a significance level of 90%. So it was found that the number of samples was 88.7 or rounded to 89 samples. Because class X students are divided into 19 classes and so that students in each class have the same opportunity in the research, the author uses the Proportional Random Sampling technique. Proportional Random Sampling is the taking of representatives from each group in the population whose number is adjusted to the number of subject members in each group (Juliandi et al., 2014). The international physical activity questionnaire in short form (IPAQ-SF) is used to assess how high weekly physical activity is, the Body Mass Index by age (BMI/U) to assess BMI and TKSI is used to measure physical fitness, This study was conducted from February 27, 2024 to March 7, 2024 at SMKN 2 Malang.

RESULTS AND DISCUSSION

This study is aimed at determining how physical activity, BMI, and physical fitness of grade X students of SMK Negeri 2 Malang are related to learning achievement. The following is a description of the data based on field information.

Table 1. Description of physical activity, BMI, physical fitness and learning achievement data

Variable	Category	Frequency	Percentage	Average	P-*Value*
Physical Activity	Tall	0	0%	Low	0.000
	Keep	84	94.4%		
	Low	5	5.6%		
IMT	Obesity	0	0%	Usual	0.075
	Fat	59	66.3%		
	Usual	25	28.1%		
	Thin	5	5.6%		
	Very Skinny	0	0%		
Physical Fitness	Very good	0	0%	Less than once	0.000
	Good	0	0%		
	Keep	7	8%		
	Less	70	78%		
	Less	12	14%		
Learning Achievement	Excellent	0	0%	Good	0.012
	Good	89	100%		
	Enough	0	0%		
	Less	0	0%		

Data shows that the physical activity of class X students of SMKN 2 Malang is dominated by the medium category with a percentage of 94.4%, followed by the low category which is only 5.6%, no students have high weekly physical activity. And through the exposure to this data, it can be stated that the average physical activity of class X SMKN 2 Malang is in the low category. Meanwhile, for the normality test from the physical activity data, a P-value of 0.000 was obtained, which is smaller than 0.05 so that it can be concluded that the physical activity data is not normally distributed.

The BMI of class X students of SMKN 2 Malang is dominated by the obese category with a percentage of 66.3%, followed by the normal category with a percentage of 28.1%, the thin category occupies the third position with a percentage of 5.6%, no students have a BMI with the obesity or very

thin category. And through the exposure to this data, it can be stated that the average IMT of class X students of SMKN 2 Malang is in the normal category. Meanwhile, for the normality test from physical fitness data, a P-value of 0.075 was obtained, which is greater than 0.05, so it can be concluded that the physical fitness data is normally distributed.

The fitness level was dominated by the poor category with a percentage of 78%, then followed by the medium category with a percentage of 14%, and the very poor category occupied the third position with a percentage of 8%, no students had good or very good physical fitness. And through the exposure to this data, it can be stated that the average physical fitness of class X students of SMKN 2 Malang is categorized as very low. Meanwhile, for the normality test from the physical fitness data, a P-value of 0.000 was obtained, which is smaller than 0.005 so it can be concluded that the physical fitness data is not distributed normally.

All students have good learning achievements, no students have very good, adequate, and also lacking learning achievements. And through the exposure to this data, it can be stated that the average learning achievement of class X students of SMKN 2 Malang is in the good category. Meanwhile, for the normality test from physical activity data, a P-value of 0.012 was obtained, which is smaller than 0.005 so that it can be concluded that the learning achievement data is not normally distributed.

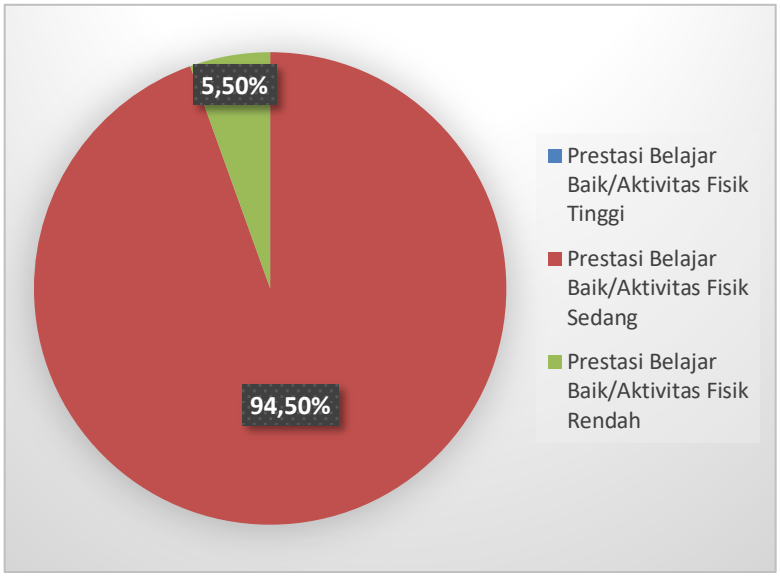

Figure 1. Graph of cross-tabulation of physical activity and learning achievement

Students who have a good academic achievement category and low activity have the least number which is only 5.50% (5) students. Then for students who have a good learning achievement category and moderate physical activity have the highest number, namely 94.5% (84) students. No student gets a high physical activity category. From the exposure to the data, it can be seen that physical activity and student learning achievement are not correlated because student learning achievement is relatively good, but none of the students have high physical activity.

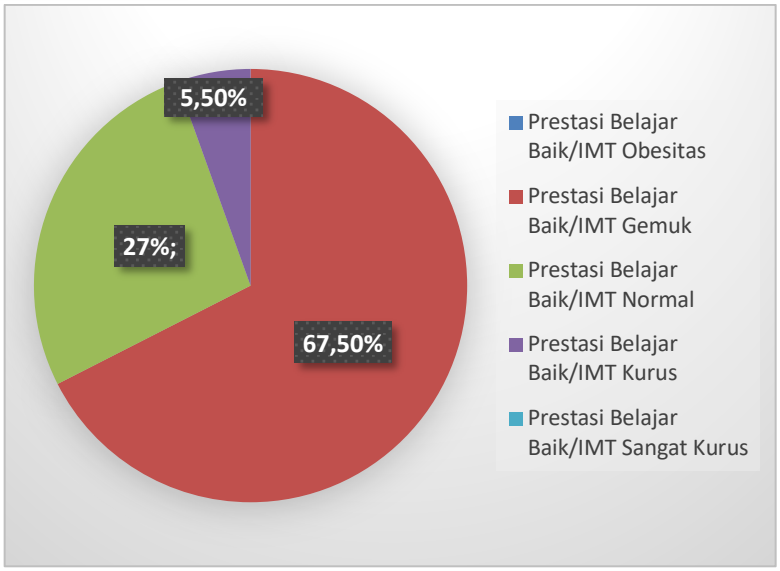

Figure 2. BMI cross-tabulation graph and learning achievement

Students who have a good academic achievement category and a thin BMI have the least number of 5.5% (5) students. Students who have a good academic achievement category and normal BMI have a total of 27% (24) students. Then students who have a good learning achievement category and have a fat BMI have the most number, namely 67.5% (60) students. No student has an obese or underserved BMI. From the exposure to the data, it can be seen that BMI and student learning achievement are not correlated because student learning achievement is relatively good, but the BMI of students is still in the category of thin and obese.

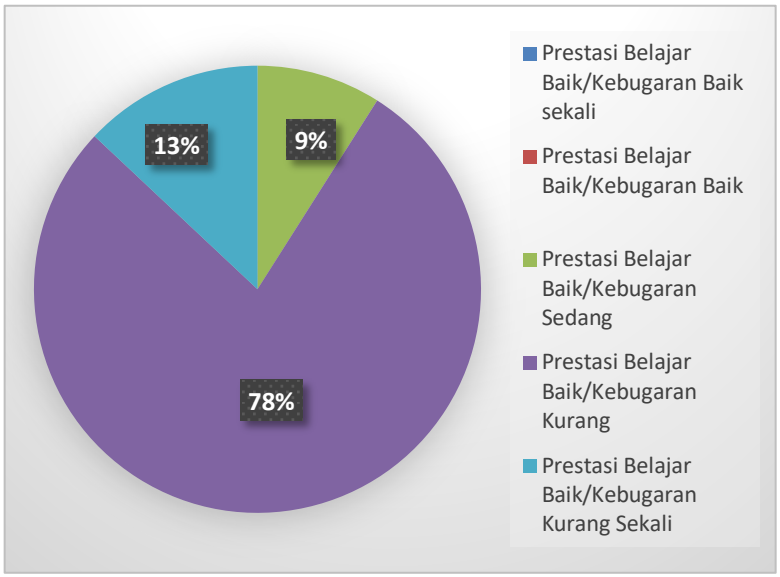

Figure 3. Physical fitness and learning achievement cross-tabulation graph

It is known that students who have a category of good academic achievement and moderate fitness have the least number, namely 8 (9%) students. Meanwhile, students who have a category of learning achievement that. Students who have a category of good academic achievement and very poor fitness have a total of 12 (13%) students. Then students who have a good academic achievement category and have poor fitness have the most number, namely 69 (78%) students. No student has good or very good fitness. From the exposure to the data, it can be seen that physical fitness and student learning achievement are not correlated because student learning achievement is relatively good, but the average physical fitness of students is in the category of very low.

Table 3. Spearman Brown Rank Correlation Analysis

Relationship	P	Sig 5%	Correlation coefficient	Information
Physics Activities with Learning Achievement	0.809	0.05	-0.026	Does not have a significant relationship
BMI with Learning Achievement	0.194	0.05	0.139	Does not have a significant relationship
Physical Fitness with Learning Achievement	0.893	0.05	-0.15	Does not have a significant relationship

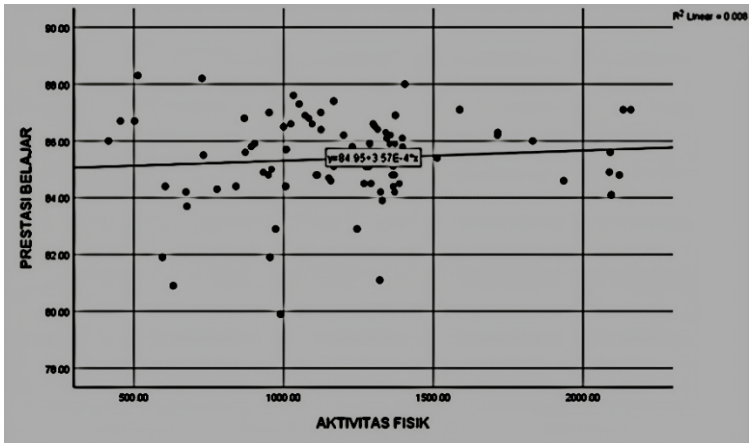

Figure 4. Graph of the relationship between physical activity and student learning achievement

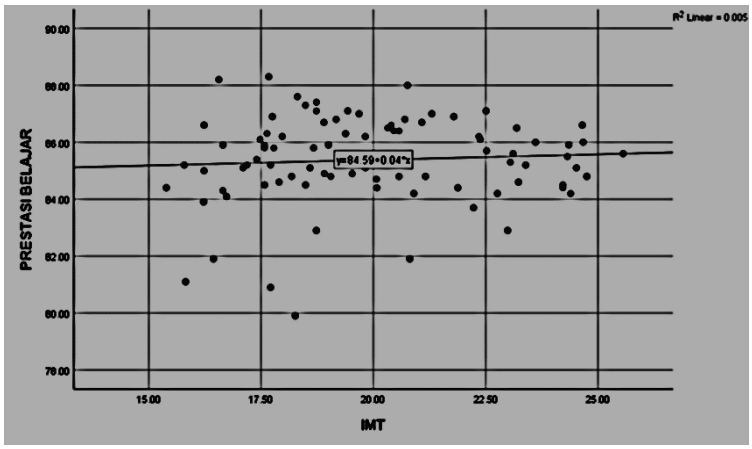

Figure 5. Graph of the relationship between BMI and student learning achievement

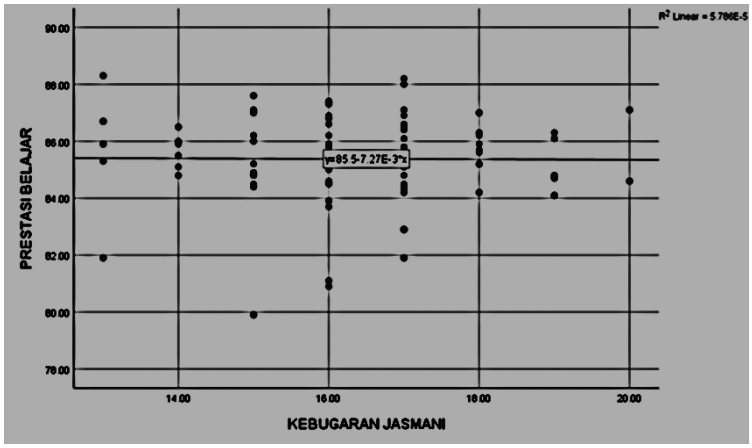

Figure 6. Graph of the relationship between physical fitness and student learning achievement

Based on the results of the Spearman Brown Rank analysis above, it can be known that. (1). There was no significant relationship between physical activity and student learning achievement because the P-value > 0.05, so Ho was accepted and Ha was rejected, with a correlation coefficient of -0.026 which indicates that the relationship between physical activity and learning achievement is negative and in the very weak category. (2). There was no significant relationship between BMI and student learning achievement because the P-value > 0.05, so Ho was accepted and Ha was rejected, with a correlation coefficient of 0.139 which indicates that the relationship between BMI and learning achievement is positive and in the very weak category. (3). There was no significant relationship between physical fitness and student learning achievement because the P-value > 0.05, so Ho was accepted and Ha was rejected, with a correlation coefficient of -0.15 which indicates that the relationship between physical fitness and learning achievement is negative and in the very weak category.

Discussion

From the cross-tabulation data, it can be seen that of the three factors there is no alignment with learning achievement, the average student learning achievement is in the good category inversely proportional to the physical activity that students have, most students have low physical activity and the highest is the sufficient category, no student has high physical activity. Likewise with the BMI owned by students, most students have a fat BMI and a few fall into the normal category. While the physical fitness of students is also inversely proportional to learning achievement where most students have poor physical fitness, none of the students have good physical fitness, let alone very good. In addition, the analysis of the spearman brown rank correlation also showed the same thing, which showed that physical activity, BMI, and physical fitness were not correlated with student learning achievement.

The results of this research are contrary to previous research, several studies state that learning achievement has a significant relationship with physical fitness. Abduh dkk, (2020) The results were obtained that the better the student's physical fitness, the better his physical fitness would be. In addition, the research conducted by (Sari & Sin, 2020) which states that physical fitness and learning achievement have a significant relationship. The results of another study revealed that even though a person has good physical fitness, it cannot be a guarantee that a person has good academic achievement. Students with low physical fitness can get good academic performance if they have good health (fit or not sick) (Prastyawan & Pulungan, 2022). Students' ability to absorb the material provided will decrease due to the student's focus being divided due to the disease they are experiencing.

A similar study examining the relationship between physical activity and learning achievement was inversely proportional to this study. Several previous studies stated that physical activity was significantly related to student learning achievement, such research included Haverkamp dkk, (2020) Those who get results students who have moderate and high (vigorous) activity categories tend to have good learning achievement and vice versa, students who have low physical activity or light tend to have poor learning achievement. With good physical activity, the body will become fit and able to do study activities that are quite energy-draining. Physical activity has a positive impact on energy balance and weight control. This affects fitness levels and increases productivity because the body functions

effectively and has enough energy to carry out activities including the learning process which affects learning achievement (Mulia dkk, 2021). From the study, it can be seen that physical activity has a positive influence on student learning achievement but other studies from Welong dkk, (2020) revealed that high physical activity can also have a negative effect on learning achievement. This indicates that students who have high physical activity are more focused on doing physical activities than learning activities, resulting in a decrease in their academic performance.

Similar to physical activity, based on previous research, body mass index (BMI) has a significant relationship with student learning achievement. The research is a study from Alhazmi, dkk (2021) which reveals that students who have a normal BMI tend to achieve good academic achievement. With a normal BMI, it will be easier for students to carry out learning activities without having difficulty moving their bodies due to being overweight. Students with overweight and obesity can cause them to be exploited and criticized by other students leading to an increase in absenteeism thereby lowering academic achievement (Rayyan dkk, 2020). However, there is also previous research that is in line with this research, namely research from Rawung dkk, (2020) which obtained the result that students who had a low BMI and were also obese were also able to make good academic achievements as well.

Several previous studies stated that learning achievement has a significant relationship with physical activity, BMI, and physical fitness but this does not apply to grade X students of SMKN 2 Malang, none of these three factors have a significant relationship with student learning achievement. This proves that the learning achievement of students at SMKN 2 Malang is more dominantly influenced by other factors besides physical health. There are many factors that can affect student learning achievement, there are 2 factors that affect learning achievement, namely internal factors and external factors, internal factors are factors that come from the human being itself such as physical health which includes physical fitness, BMI, and physical activity, then psychological, interests and talents, intelligence, and also motivation. Meanwhile, external factors consist of teachers' teaching methods, school environment, family environment, and social environment. The main factors are student factors, such as student learning skills, motivation, parental background, environment, and peer influence. Likewise with factors related to teachers, school factors, socio-cultural factors, and others (Suleiman, 2023).

The motivation that students have has a very big influence on student learning achievement. Students who have good learning motivation have good learning achievement as well (Tokan & Imakulata, 2019). In learning activities, motivation is very necessary because if a person does not have motivation, learning activities will not take place effectively. This is because students who have high motivation in learning have goals to achieve so that they spur enthusiasm to be more active in learning what the teacher teaches during the learning process. Students who have high motivation to learn will tenaciously try to face the difficulties experienced (Sidabutar dkk, 2020). With high determination and tenacity, students will quickly develop and be able to make good learning achievements as well. It can be concluded that the learning motivation of class X students of SMKN 2 Malang is classified as high.

The effectiveness and skills of teachers in managing learning are also able to affect student learning achievement. Teachers who are skilled in managing learning such as being skilled in explaining the material will make it easier for students to grasp the material given by the teacher, while if the teacher is not skilled in learning, it will cause confusion and incomprehension of students about the material explained by the teacher. The skill of explaining teachers who are more innovative and creative that is adapted to the characteristics of the subject will encourage the ability of students to meet the minimum completeness criteria in achieving better learning outcomes (Gumohung dkk, 2021). A teacher must have four teaching abilities including personal competence, professional competence, pedagogical competence, and social competence (Fitriani dkk, 2022). By mastering these four teaching skills, learning can run optimally and can achieve educational goals. Through the results of the research, it can be seen that the learning achievement of students is relatively good, so it can be concluded that the teachers at SMKN 2 Malang have good teaching skills.

Student learning achievement is also supported by students' interest in learning, the better the interest in learning, the more serious students are in pursuing knowledge. Students have a high interest in learning, so students will have high learning achievement. Likewise, if students have low learning abilities, then the student's learning achievement will be less (Titisari & Pawenang, 2021). Interest in learning is closely related to learning motivation and also teachers' skills in teaching, the better the interest in learning and the teacher's skills in learning will increase students' interest in learning (Sarah

dkk, 2021). Therefore, it is important for schools to always pay attention to student learning motivation and teacher competence in order to arouse interest in learning so that students are able to obtain good learning achievements. From the results of the study, it can be concluded that the learning interest of students in class X of SMKN 2 Malang is high.

From the results of the physical activity study, BMI, and also physical fitness do not have a significant relationship with student learning achievement, but the results of this study do not solely ensure that the three factors above are not needed by students during the learning process. These three factors are factors that also support student learning activities, good physical activity and good physical fitness help students to be able to complete 8 hours of learning from start to finish in one day, besides that BMI is also normal to help make it easier for students to carry out their daily movement activities in the school environment. In addition, these three factors are the goals of national education, namely making students physically and spiritually healthy, so that these three factors must be considered and improved in order to achieve the goals of national education.

CONCLUSION

Based on the results and discussion, it can be concluded that (1). There was no significant relationship between physical activity and the learning achievement of students in class X of SMKN 2 Malang. (2). There was no significant relationship between IMT and the learning achievement of students in class X of SMKN 2 Malang (3). There was no significant relationship between physical fitness and the learning achievement of class X students of SMKN 2 Malang. There are shortcomings in this study, the measurement of physical fitness in this study involves all basic elements of fitness, namely, speed, muscle endurance, eye-hand coordination, agility, muscle explosiveness, and cardiovascular endurance, these six elements are relevant when associated with physical education subjects but not relevant when associated with other subjects that do not have a lot of movement activity. It is hoped that future research similar to this study will focus more on the physical fitness element that has the most influence on student learning achievement.

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