

Influence of BMI, Body Fat Percent, Physical Activity, on Sports Fitness; Correlation Study on Students of SMP Negeri 3 Bandar Lampung



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ABSTRACT: This study aims to determine the relationship between BMI, percent body fat, and physical activity on physical fitness of VIII grade students of SMP Negeri 3 Bandar Lampung. This type of research is quantitative with a correlational approach. The population in this study were VIII grade students of SMP Negeri 3 Bandar Lampung aged 13-14 years as many as 100 people, based on total sampling technique. The instruments used to measure BMI are scales and meters, measurement of body fat percentage is done in several parts, namely biceps, triceps subscapula, and supraillia, physical activity using questioner Physical Activity Level, Physical fitness is measured by the Physical Fitness Test (TKJI) age 13-15 years. Data analysis techniques using Pearson Correlation Product Moment analysis. The results showed that (1) There is a significant influence between BMI on physical fitness of VIII grade students of SMP Negeri 3 Bandar Lampung with r count 0.374. (2) There is a significant effect of body fat percent on the physical fitness of VIII grade students of SMP Negeri 3 Bandar Lampung with r count 0.439. (3) There is a significant influence between physical activity on physical fitness of VIII grade students of SMP Negeri 3 Bandar Lampung with r count. (4) There is a significant influence of BMI, body fat percent, and physical activity on the physical fitness of students in class VIII of SMP Negeri 3 Bandar Lampung with r count. (5) Physical activity has a greater influence on the physical fitness of VIII grade students of SMP Negeri 3 Bandar Lampung with r count. The coefficient of determination shows that physical activity has an influence of 40.96% on physical fitness.

KEYWORDS: BMI, persen lemak tubuh, aktivitas fisik, kebugaran jasmani

INTRODUCTION

Physical fitness is one of the components in human life that is very necessary, so that all daily activities can run well. Physical fitness can be obtained by doing physical activities regularly, measured, and programmed (Hastie, 2017). Good physical fitness is the main capital for a person to carry out physical activities repeatedly in a relatively long time without causing significant fatigue. By having good physical fitness, a person is expected to be able to work productively and efficiently, not susceptible to disease. Low levels of physical activity are one of the factors in increasing body mass index (BMI). Changes in BMI can occur in various age groups and gender, including children (Pandey et al., 2017).

BMI and physical activity are two interrelated variables because the higher the intensity of physical activity, the better the BMI. Conversely, the lower the physical activity performed, the worse the BMI is likely to be. Low physical activity causes the accumulation of energy by the body in the form of fat (Bowden Davies et al., 2019). If this happens continuously, it will cause an increase in BMI. However, the level of physical activity performed must be in accordance with portions, regular and not excessive in order to produce good results. BMI is a very simple way of categorizing children's weight and can be used in large-scale population studies. The measurement only requires two components, namely body weight and height (Djalalinia et al., 2020). BMI can be used for nutritional status assessment or determining body composition proportion standards in adults, adolescents and children (Trung et al., 2019); (Peterson et al., 2017).

The habit of passive behavior patterns to do physical activity, especially in children, makes the opportunity to increase body mass index even greater. There is an assumption that the higher a person's BMI, the lower the physical activity. Individuals with low physical activity have a greater risk of increasing body weight than children who are active in regular exercise. Inactive people require less energy. A person who tends to consume fat-rich foods and does not engage in balanced physical activity, will become obese. Percent body fat, one of the indicators in anthropometric measurements, describes the ratio of fat mass and fat free mass in a person's body. High body fat percent can be influenced by several things, such as nutrient intake, education,

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nutritional knowledge, family income, physical activity, and lifestyle. Dietary deviations have been common in the community lately. Some people usually consume foods that tend to be high in energy (fat, protein, and carbohydrates) and low in fiber such as fast food (Sobhani et al., 2021).

This is reinforced by research (Roberts et al., 2018) on 7745 adolescent girls and 6610 adolescent boys. The results of cross sectional analysis show that on average adolescents have a BMI of 19.1 for adolescents who never consume fast food or less than 1 time / week. Then the average adolescent had a BMI of 19.2 for those who consumed fast food 1-3 times/week, and a BMI of 19.3 for those who consumed fast food 4-7 times/week. There is a positive relationship between high fast food consumption and increasing one's BMI. Hopefully, the research to be conducted can optimize the factors that support physical fitness in students. Starting from improving nutrition and food intake, rest, and sports activities. It is hoped that after this research can increase the awareness of students to consume foods that are nutritious for health. In addition, students who go to school in villages and in cities can fulfill an adequate and balanced portion of nutrition so that there is no gap between the two schools. After nutrition and food intake are fulfilled, the author hopes that students can maintain a good rest pattern so that growth and development increase optimally.

METHOD

This type of research is correlational research. Correlational research is research conducted to determine whether there is a relationship between two or more variables. The population in the study was class VIII students of SMP Negeri 3 Bandar Lampung aged 13-14 years as many as 100 people, based on total sampling technique. The instruments used to measure BMI are scales and meters, measurement of body fat percentage is done in several parts, namely biceps, triceps subscapula, and suprailiaca, physical activity using questioner Physical Activity Level, Physical fitness measured by the Physical Fitness Test (TKJI) age 13-15 years. Data analysis technique is Correlation Product Moment. Previously, a normality pre-test was carried out.

RESULT

The results of descriptive analysis aimed to determine BMI, percent body fat, physical activity, and physical fitness level of SMP Negeri 3 Bandar Lampung students. The complete results are in Table 1.

Table 1. Descriptive Statistics of Motor Ability Variables

No	Statistics	N	Mean ± SD
1	BMI (X1)	100	18.61 ± 3.08
2	Body Fat Percent (X2)	100	18.68 ± 5.50
3	Physical Activity (X3)	100	1.81 ± 0.28
4	Physical Fitness (Y)	100	14.33 ± 3.04

The data normality test in this study used the Kolmogorov-Smirnov method. The results of the data normality test conducted on each group were analyzed with the SPSS version 20.0 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

No	Variabe	p-value	Sig	Description
1	BMI (X1)	0.510	0.05	Normal
2	Body Fat Percent (X2)	0.589	0.05	Normal
3	Physical Activity (X3)	0.504	0.05	Normal
4	Physical Fitness (Y)	0.380	0.05	Normal

Based on the statistical analysis of normality tests that have been carried out using the Kolmogorov-Smirnov test in Table 2, the variables of BMI, percent body fat, physical activity, and physical fitness level obtained normality test results with p-value > 0.05, which means the data is normally distributed.

The analysis technique used to test the hypothesis uses the Pearson Product Moment correlation test analysis technique. If the p-value < 0.05, then the hypothesis is accepted and the p-value > 0.05, then the hypothesis is rejected. The results of the analysis are presented as follows.

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Table 3. Correlation Test Results

correlation	r hitung	p-value	Description
BMI (X1) to Physical Fitness Level (Y)	0.374	0.000	Significant
Body Fat Percent (X2) to Physical Fitness Level (Y)	0.439	0.000	Significant
Physical Activity (X3) to Physical Fitness Level (Y)	0.640	0.000	Significant

Based on Table 3 above, the relationship between BMI (X1) to the level of physical fitness (Y) obtained the coefficient r count 0.374 and p-value 0.000 <0.05. Based on the analysis, the hypothesis that there is a significant relationship between BMI and the level of physical fitness of students of SMP Negeri 3 Bandar Lampung is accepted. The correlation coefficient is positive, meaning that if BMI is getting better, then the students' physical fitness level will also be better. BMI gives an influence of 13.98% on physical fitness.

Based on Table 3 above, the relationship between physical activity (X3) to the level of physical fitness (Y) obtained the coefficient r count 0.640 and p-value 0.000 <0.05. Based on the analysis, the hypothesis that there is a significant relationship between BMI and the level of physical fitness of students of SMP Negeri 3 Bandar Lampung is accepted. The correlation coefficient is positive, meaning that if physical activity is getting better, then the students' physical fitness level will also get better. Physical activity provides an influence of 40.96% on physical fitness.

The F statistical test is carried out with the aim of showing all independent variables included in the model that have a joint influence on the dependent variable. If the p-value < 0.05, the hypothesis is accepted and the p-value > 0.05, the hypothesis is rejected. The results of the analysis are presented as follows.

Table 4. Anova (F) Test Results

Model Summary		Model
R		0.821
R Square		0.674
Adjusted R Square		0.650
Std. Error of the Estimate		0.8958
Change Statistics	R Square Change	0.674
	F Change	28.206
	df1	3
	df2	41
	Sig. F. Change	0.000

Table 4 shows that the calculated F value is 28.206. The F distribution table is searched using the 95% confidence level, obtained for the F table of 2.83. Because the value of F count > F table (28.206 > 2.83) then Ho is rejected, meaning that simultaneously BMI, percent body fat, and physical activity on physical fitness of students in class VIII SMP Negeri 3 Bandar Lampung.

The magnitude of the correlation or influence of BMI, percent body fat, and physical activity on physical fitness (R) is 0.821. The percentage of the influence of the independent variable on the dependent variable called the coefficient of determination which is the result of the R pengudratan is 0.674. It means that BMI, percent body fat, and physical activity give a joint influence (simultaneously) on physical fitness by 67.4%, and the remaining 32.6% is determined by other factors or variables.

DISCUSSION

Effect of BMI on Physical Fitness

Based on the results of research conducted on VIII grade students of SMP Negeri 3 Bandar Lampung, it shows that BMI, percent body fat, and physical activity have an influence on physical fitness. Based on data analysis BMI has an influence on physical fitness. This is shown by the pearson correlation value of 0.374, meaning that BMI has an influence of 13.98% on physical fitness. BMI with obese category can affect physical fitness. In the research results obtained that students who have BMI in the obese category do not exist. So there is a low influence of BMI on the level of physical fitness. These results can be interpreted that BMI is one component that affects a person's physical fitness. These results are supported in research (Koliada et al., 2017); (Vancampfort et al., 2017); (Borga et al., 2018), showing that there is a relationship between BMI and physical fitness level.

Based on the results of this study, it can be concluded that there is a significant relationship between BMI and physical fitness level. Children with obesity tend to have lower physical fitness levels compared to children with normal body mass index. An

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increase in body mass is associated with the level of food consumption. In obesity there is excessive accumulation of fat in the body tissues so that oxygen consumption becomes less optimal, this will certainly reduce the level of physical fitness. Children with obesity also tend to have limited physical activity. This also causes low levels of physical fitness in children with obesity (McCoy & Morgan, 2020).

Effect of Percent Body Fat on Physical Fitness

Body fat percentage is the ratio of body fat mass compared to body composition. Body composition includes two things, body mass index and body fat percentage. Body fat percentage depends on the type of physical activity performed on a daily basis and the diet consumed. The results of the body fat percentage analysis show that there is a significant influence on physical fitness. This is indicated by the pearson correlation value of 0.439, so percent body fat has an influence of 19.27% on physical fitness. In research conducted (Kye et al., 2021); (An et al., 2019); (Park et al., 2018), that the higher a person's body fat percent, the lower the level of physical fitness. The data obtained by the average student body fat percent is in the normal category, this is in accordance with the theory which states that an increase in body fat percent can reduce the level of physical fitness. Based on the results of the body fat percent analysis, it shows a positive correlation, meaning that there is a significant influence on the level of physical fitness. The value of the correlation coefficient means that the higher the percent of body fat, the higher the level of physical fitness. In accordance with the theory which states that an increase in body fat percent can reduce the level of physical fitness.

Based on the analysis that has been done, there are still many students eating high-fat, high-calorie foods, and drinking drinks that contain a lot of sugar, especially from irregular eating patterns during the night hours, this causes excessive fat accumulation in students. In the measurement results there were 6 students who had the obese category. After analysis, it turns out that the students are female who have bad habits from diet, rest, and also eat foods that contain lots of calories such as junk food consumed at night. These bad habits cause a high risk of obesity. Children who have excessive body weight or are overweight (obese) usually have a high habit of eating light foods, a lot of solitude, a lot of silence in the room or at home, more sleep, so less or even do not like physical activity and exercise. Children who are obese in addition to their movement skills will tend to be stiff and not agile. This is caused by the number of calories entered and energy expended is not balanced, resulting in obesity in children (Agita et al., 2018).

Effect of Physical Activity on Physical Fitness

In physical activity research using activity instruments carried out for 24 hours (Activity recall) expressed in Physical Activity Level (PAL). Calculation of PAL values is done by referring to the formula issued by FAO (2019). In the results of the analysis that has been carried out, there is a significant influence between physical activity on the physical fitness of students. This is indicated by the pearson correlation value of 0.640. So, physical activity has an influence on physical fitness by 40.96%. These results are positive, meaning that the better the physical activity, the better the physical fitness, on the contrary, if the physical activity carried out is low, then the low level of physical fitness possessed by students.

Physical activity is not only limited to sports-specific activities, but also other activities that require physical labor, such as sweeping, mopping, washing, walking, dancing, painting, hoeing, walking, and so on (Hussain et al., 2019). The bad thing that is usually done by students of SMP Negeri 3 Bandar Lampung is that the high intensity of playing online games has various kinds of impacts or influences on both the physical and psychological individuals. The physical impact can be in the form of fatigue in the limbs due to too long playing games which causes decreased body health so that it is easily sick. As for students who have moderate physical activity, they do sports or their hobbies, such as playing basketball, futsal, soccer, and others. While those who do physical activity in the heavy category, do sports activities that have been scheduled and have their respective training programs. Many benefits for the body are caused by physical activity. Other benefits are such as increased cardiorespiratory fitness, increased muscle strength, decreased symptoms of depression, and a sustained decrease in blood pressure.

Effect of BMI, Percent Body Fat, and Physical Activity on Physical Fitness

Based on the results of the analysis as a whole BMI, percent body fat, physical activity, and physical fitness must have good criteria, due to the magnitude of the coefficient of determination of 0.674. Contains the understanding that BMI, percent body fat, and physical activity provide a joint influence on physical fitness by 67.4%, and the remaining 32.6% is determined by other factors or variables. There are still many students who are lazy in doing physical activities such as exercising, often consuming fast food, very high academic demands. Moreover, gadget life with fast internet connections makes students addicted to playing mobile games, no time in playing social media, so that there is a lack of rest time at night. This clearly affects the level of physical fitness in a person. While a good level of physical fitness is needed by every individual.

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For students, having a body condition with excellent condition is the main thing, because it is to face the learning process optimally. This can be seen in the results of data analysis, students who have BMI in the normal category, percent body fat in the normal category, good physical activity, will have good physical fitness as well. This is very necessary to support learning activities at school and daily activities outside of school. This is reinforced by the theory put forward (Liu et al., 2021) that having a good physical condition of the body will greatly affect the functions and systems of the body's organisms, including, (1) there will be an increase in the ability of the circulatory system and heart work, (2) there will be an increase in strength, stamina, and other physical conditions, (3) there will be a better economy of motion during exercise, (4) there will be a faster recovery in the organs after exercise, (5) there will be a quick response from our body organisms if at any time such a response is needed. Therefore, students must pay attention to their respective physical conditions to be able to carry out the learning process properly and daily activities.

CONCLUSIONS

Based on data analysis, it can be concluded that: (1) There is a significant influence between BMI on the physical fitness of VIII grade students of SMP Negeri 3 Bandar Lampung with a pearson correlation value of 0.374. It is said to be low in the guidelines for the degree of relationship. The coefficient of determination shows that BMI has an influence of 13.98% on physical fitness. (2) There is a significant effect of body fat percent on the physical fitness of VIII grade students of SMP Negeri 3 Bandar Lampung with a pearson correlation value of 0.439. It is said to be quite strong in the guidelines for the degree of relationship. The coefficient of determination shows that the percent of body fat gives an influence of 19.27% on physical fitness. (3) There is a significant influence between physical activity on physical fitness of class VIII students of SMP Negeri 3 Bandar Lampung with a pearson correlation value of 0.640. It is said to be strong in the guidelines for the degree of relationship. The coefficient of determination shows that physical activity has an influence of 40.96% on physical fitness. (4) There is a significant influence of BMI, percent body fat, and physical activity on the physical fitness of VIII grade students of SMP Negeri 3 Bandar Lampung with a coefficient of determination of 0.674. Containing the meaning that BMI, percent body fat, and physical activity provide a joint influence on physical fitness by 67.4%. (5) Physical activity has a greater influence on the physical fitness of VIII grade students of SMP Negeri 3 Bandar Lampung with a pearson correlation value of 0.640. The coefficient of determination shows that physical activity has an influence of 40.96% on physical fitness.

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