The Relationship Between Body Mass Index and Physical Fitness Level of Grade XII (Twelve) Students of SMA Negeri 16 Bekasi City 2023

Muhammad Rohid Syafiq Susanto
Fakultas Ilmu Keolahragaan / State University Jakarta / DKI Jakarta / Indonesia
muhammadrohid880@gmail.com

ABSTRACT
The level of physical fitness can affect the problem of deficiency and overnutrition in students. This needs to be tested using the Body Mass Index (BMI) to monitor nutrition simply. This study aims to determine the relationship between the Body Mass Index and the level of physical fitness of students of Class XII (twelve) State High School 16 Cities of Bekasi. The study uses the Correlation Descriptive Method, and data collection techniques using Measurement of Body Mass Index and Student Physical Fitness, the study design used is the correlation of two variables. The population in this study was 320 students, taking a sample of 32 students. To test the probability of the correlation coefficient X against Y which indicates that t counts = -2.042 that Ho is rejected, Ha is received with the correlation coefficient r = -0.455 which means moderate and significant (P < 0.05) the direction of influence is negative where the smaller the Body Mass Index the greater the Physical Fitness Level. It can be concluded that there is a meaningful relationship between the Body Mass Index and the Physical Fitness Level, that is the Moderate Correlation Level. It can be information for teachers to strive to improve the level of physical fitness of students by giving the motivation to exercise on a routine and giving physical exercise to improve physical fitness, because if only the status of the student is good but does not do physical exercises then the student's fitness will not improve.

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KEYWORDS
Physical Fitness; Body Mass Index.

INTRODUCTION
Health is very valuable compared to anything else in this world. With a healthy body, humans can carry out their daily activities well. Physical activity is the need of every human being in his life so that his physical condition and health are well maintained. Physical activity that is routinely done will train the body to be more fit.

Physical fitness is one of the important things to maintain the health status of one's body. Physical fitness has a very important function in a person's life in carrying out daily activities. Physical fitness serves to improve work ability for anyone who has it so that they can carry out their tasks optimally to get better results. A person is said to have a fit...
body if the body is able and can make adjustments to the physical activity carried out by the body without resulting in excessive fatigue. The higher the degree of physical fitness a person has, the higher his physical work ability. According to Sharkey in F Suharjana (2008), to achieve "quality of life" there are three aspects that must be met, namely: regulating food, regulating rest, and regulating activities (sports).

How to Improve Physical Fitness, for the improvement and maintenance of physical fitness is inseparable from physical training that builds the balance of physical fitness elements. To build or maintain physical freshness, one way is to do physical exercise or physical exercise. An exercise that is intended to improve physical fitness, must be done according to certain rules or methods.

A fit body is needed to adjust to the many activities of students who are so dense. The problem of undernutrition and overnutrition in students is important because, in addition to having the risk of certain diseases, it can also affect learning productivity. Therefore, maintaining a normal body weight allows a person to achieve a longer life expectancy. The problem of undernutrition and overnutrition in students is important because, in addition to having the risk of certain diseases, it can also affect learning productivity. The quality of nutrition found in students greatly impacts student activities in following the process of teaching and learning activities at school.

Based on observations that have been made, some students are very agile compared to other students. Then some students do not seem exhausted even though they have participated in heavy physical activities and are even able to continue other activities without difficulty. This situation is inseparable from the state of the student body where there are fat, short, tall, or thin students who each carry out their activities. The state of the body as part of the body composition certainly has the quality of movement activities that are not the same.

Therefore, it is necessary to do testing, namely by using Body Mass Index (BMI). According to Supriasa (2016) Body Mass Index (BMI) is a simple tool or way to monitor the nutritional status of adults, especially those related to deficiency and overweight. Body mass index as a means of predicting a person's nutritional status is influenced by nutrition, physical activity, and genetics. Its components consist of height and weight. Body Mass Index is used to determine body shape or body proportions such as thin, fat, and ideal body of a person by measuring weight then dividing by height in (m²) after that to determine the category can be seen through the table of Body Mass Index categories.

The ideal size of body mass index is a category of having adequate nutrition with the needs of the body where the condition is very influential on a person's activities. For example, the activity of someone who has a normal mass index will not experience difficulties so the activity can be completed without feeling tired. Conversely, someone who has excess nutrition will have difficulty in carrying out his exercise activities, this is due to excessive fat accumulation so he is less passionate about carrying out the movement process. This can result in feeling tired quickly, shortness of breath, and a high pulse rate. While someone who has a lower body mass index condition is no different
from someone who has excess nutrition, this is due to excessive nutritional input with the body's needs in releasing energy. This leads to a reduced passion for exercise.

The BMI / U Z-score index is used to determine the categories of malnutrition, undernutrition, good nutrition, risk of overnutrition, overnutrition, and obesity. BMI/you charts and BB/PB or BB/TB charts tend to show the same results. However, the BMI/U Z-score index is more sensitive for screening children for overnutrition and obesity. In adolescents, BMI measurements are closely related based on age, because based on changes in age there are changes in body composition and body density, in adolescents BMI / U indicators are used. Adolescents aged 16-18 years BMI values must be compared based on references to the Ministry of Health, R. I. (2020). Regulation of the Minister of Health of the Republic of Indonesia concerning Child Anthropometry Standards. At the moment it is most often done to express the index based on the Z-score.

Therefore, maintaining a normal body weight allows a person to achieve a longer life expectancy. The problem of undernutrition and overnutrition in students is important because, in addition to having the risk of certain diseases, it can also affect student learning productivity.

**METHODS**

This research was conducted using a descriptive method with correlation study techniques because this study collected data by measuring and recording the results of the Measurement of Body Mass Index (BMI) and Physical Fitness Level of students. The research design used is a correlational research design that connects two or more variables, namely between variable x (Body Mass Index) and variable y (Physical Fitness Level).

This research was carried out on Wednesday, November 29, 2023, at SMA Negeri 16 Bekasi City which is located at Jl. Arteri Tol Jorr Jatimelati, RT.003/RW.002, Kel. Jatimelati, Kec. Pondok Melati, Bekasi City, Prov. West Java.

The population in this study is all Class XII (twelve) students of SMA Negeri 16 Bekasi City totaling 320 students with a ratio of 187 male students and 133 female students, with a sampling technique namely Purposive Random Sampling according to Arikunto (2010) which is sampling based on certain goals by taking 10% of the total population. Therefore, the number of samples used was 32 students.

In this study, the instruments used for data collection were test instruments, namely (1) Measurement of Body Mass Index (BMI) using measuring instruments, namely weight scales and height measurements, and (2) Measurement of Physical Fitness Level using the Indonesian Physical Fitness Test (TKJI).

The data collection technique used in this study was by measuring Body Mass Index (Measurement of Weight and Height) and Physical Fitness Level (60-meter sprint; Body lift (30-sec pi, 60-sec pa); Lying sitting for 60 seconds; Jump upright; Long run (1000 m pi, 1200 m pa))

The data analysis technique used in this study is a correlation technique using the Pearson Product Moment formula according to Sudjana (2003), which is as follows:
\[ r_{xy} = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{(n(\sum x^2) - (\sum x)^2)(n(\sum y^2) - (\sum y)^2)}} \] (1)

And by testing the meaning of the correlation coefficient with the t-test formula according to Sudjana (2005), namely:

\[ T_{hitung} = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \] (2)

However, before that, an interpretation of the t (partial) test was carried out according to Nuryadi, et al. (2017), namely, (1) If (+) t-counts > (+) t-table then Ho is rejected, Ha is accepted; If (-) t-counts < (-) t-table then Ho is rejected, Ha is accepted. (2) If (+) t-counts < (+) t-table then Ho is rejected, Ha is rejected; If (-) t-counts > (-) t-table then Ho is accepted, Ha is rejected.

RESULTS AND DISCUSSION

Description of this research data to obtain an overview of the distribution of data including the highest value, lowest value, average value, standard deviation, variance, frequency distribution, and histogram of each variable X and Y. Here is the complete data:

### Table 1.
Description of Body Mass Index (BMI) and Physical Fitness Level Data

<table>
<thead>
<tr>
<th>Variable</th>
<th>Max</th>
<th>Min</th>
<th>Mean</th>
<th>SB</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Mass Index</td>
<td>28.7</td>
<td>17.3</td>
<td>22.5</td>
<td>3.27</td>
<td>10.68</td>
</tr>
<tr>
<td>Physical Fitness Level</td>
<td>17</td>
<td>7</td>
<td>12.84</td>
<td>2.27</td>
<td>5.14</td>
</tr>
</tbody>
</table>

### Body Mass Index Data (X)

From Table 1 above, it can be seen that the variable Body Mass Index (BMI) is obtained from the range of 17.3 to 28.7 with an average value of 22.5 and a standard deviation of 3.27 and a variance of 10.7.

### Table 2.
Body Mass Index (BMI) Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Max</th>
<th>Min</th>
<th>Mean</th>
<th>SB</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>18 yrs, 9 months</td>
<td>17 yrs, 0 mo</td>
<td>17 yrs, 6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>185 (cm)</td>
<td>163 (cm)</td>
<td>171.6 (cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>86 (kg)</td>
<td>47 (kg)</td>
<td>66.4 (kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMT</td>
<td>28.7</td>
<td>17.3</td>
<td>22.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From Table 2 above, it can be seen that the average age of respondents is 17.6 years with an average height of 171.6 cm an average weight of 66.4 kg, and an average BMI of 22.5. Based on the age of respondents <19 years, the Body Mass Index (BMI) needs to be entered into the formula and calculated again using the body mass index formula according to age z-score (BMI / U Z-Score) so that the category of body mass index from respondents is obtained. The following is a presentation of Body Mass Index data according to Z-Score:
Figure 1.
Body Mass Index (BMI) Data

Based on the BMI data graph, there were 23 respondents thanks to good nutrition (normal), 7 respondents in the overweight category, 2 respondents in the obesity category, and 0 respondents in the less (thinness) category.

Physical Fitness Level Data (Y)

From Table 1 above, it can be seen that the Physical Fitness Level (TKJ) is obtained from the range of 7 - 17 with an average value of 12.84, Standard Deviation (SB) of 2.27 and variance of 5.15.

Table 3.
Characteristics of Physical Fitness Level

<table>
<thead>
<tr>
<th>Variable</th>
<th>Max</th>
<th>Min</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprint (60 m)</td>
<td>11.78” (s)</td>
<td>7.64” (s)</td>
<td>8.81” (s)</td>
</tr>
<tr>
<td>Body Lift</td>
<td>13 (reps)</td>
<td>0 (reps)</td>
<td>5 (reps)</td>
</tr>
<tr>
<td>Lying Sitting</td>
<td>50 (reps)</td>
<td>13 (reps)</td>
<td>37 (reps)</td>
</tr>
<tr>
<td>Jump Upright</td>
<td>70 (cm)</td>
<td>38 (cm)</td>
<td>50 (cm)</td>
</tr>
<tr>
<td>Long Run (1200m)</td>
<td>12'10” (minutes)</td>
<td>5'17” (minutes)</td>
<td>7'41” (minutes)</td>
</tr>
<tr>
<td>TKJI Value</td>
<td>17</td>
<td>7</td>
<td>13</td>
</tr>
</tbody>
</table>

From Table 3 above, the results obtained were the respondent’s average 60 m sprint of 8.81” (seconds), average body lift of 5 (reps), average sitting up 37 (reps / repetitions), average vertical jump (vertical jump) 50 cm, average long run 1200 m for 7’41” (minutes), and average TKJI value of 13.

Based on the characteristics that have been obtained, it can be categorized the level of physical fitness (TKJ) of respondents, namely in the graph as follows:
Based on the Physical Fitness Level data graph above, there are 17 respondents categorized (Less), 13 respondents categorized (Medium), 2 respondents categorized (Less once), and 0 respondents categorized (Good) and (Very Good).

The relationship between variables X and Y is shown by the correlation coefficient \( r = -0.455 \). The correlation coefficient must first be tested for its meaningfulness before being used to conclude. This is shown in the table as follows:

**Table 4.**

<table>
<thead>
<tr>
<th>Correlation Coefficient</th>
<th>t-count</th>
<th>t-table</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.455</td>
<td>-2.805</td>
<td>-2.042</td>
</tr>
</tbody>
</table>

From Table 4 above, it can be seen that \(-t\) count = \(-2.805 < t\) table = \(-2.043\) which means \(H_a\) is accepted or significant correlation, with a correlation coefficient \( r = -0.455 \) which means medium and significant (\(P < 0.05\)), the direction of influence is negative where the smaller the Body Mass Index, the greater the Physical Fitness Level. Thus the hypothesis that says there is a meaningful relationship between body mass index and physical fitness level is supported by research data that has a negative effect, which means a decrease in body mass index will increase the level of physical fitness.

It is marked that \(t\) count = \(-2.805\) is smaller than \(t\) table = \(-2.042\) then \(H_o\) is rejected, \(H_a\) is accepted the direction of influence is negative where the smaller the Body Mass Index the greater the Physical Fitness Level.

As in the study "The Relationship Between Body Mass Index, Percent Body Fat, And Belly Fat With U20 Futsal Athlete Fitness (Diyananda, D. 2023)" with a correlation value \( r = -0.471 \), "The Relationship of Body Mass Index with Physical Fitness of Students of the Faculty of Medicine, University of North Sumatra 2013-2014 (Mustofa, R. I. 2015)" with a correlation value \( r = -0.416 \), "The Relationship of Body Mass Index to Physical Fitness of Civil Engineering Students of the University of Muhammadiyah Yogyakarta Force 2015 (Ramadhan, R. 2020)" with a correlation value of \( r = -0.810 \), and "The Relationship of Body Mass Index with Physical Fitness Level of Children Aged 10-12 Years (Study at MIN 9 Hulu Sungai Tengah, South Labuan Amas District, Hulu Sungai Tengah Regency) (Sunarni, Y. 2019)" with a correlation value of \( r = -0.297 \). Which shows the same relationship.

**CONCLUSION**

Based on the analysis of data and the results of measurements carried out in this study, it can be concluded that there is a meaningful relationship between Body Mass Index (BMI) and Physical Fitness Level, namely with a moderate correlation level. It is marked that \(t\) count = \(-2.805\) is smaller than \(t\) table = \(-2.042\) then \(H_o\) is rejected, \(H_a\) is accepted the direction of influence is negative where the smaller the Body Mass Index the greater the Physical Fitness Level.

From the research that has been done, it is expected that there will be intensive coaching from Physical Education Sports and Health teachers to strive to improve the
level of physical fitness of students by motivating them to exercise regularly and provide physical exercise to improve physical fitness because if only the nutritional status is good but do not do physical exercises, the fitness of these students will not increase. From the research that has been done, it is also expected to be a follow-up research with other physical elements and components as an effort to improve the level of physical fitness that has not been revealed in this study.

REFERENCES
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Muhammad Rohid Syafiq Susanto
muhammadrohid890@gmail.com


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