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The Relationship Between Diet, Physical Activity, Rest Patterns and Fitness

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Abstract

Healthy lifestyle habits during adolescence, especially among junior high school students, are an important stage in supporting long-term physical development and fitness. This study aims to determine the relationship between diet, physical activity, and rest patterns with fitness focused on the cardiorespiratory endurance of junior high school students. The study used a cross-sectional design and involved 60 eighth and ninth grade students at junior high school 1 Panggarangan, Lebak Regency, Banten. Data were collected using the AFHC questionnaire for dietary patterns, the IPAQ for physical activity, the PSQI for sleep patterns, and the Beep Test to measure fitness. Data analysis includes descriptive statistics, Spearman's correlation, and multiple linear regression. The results of the study show that diet is related to physical activity, where students with healthier eating habits tend to be more active. However, no relationship was found between diet, physical activity, and sleep patterns and fitness levels. Regression analysis also shows that these three variables do not contribute significantly to variations in student fitness. These findings indicate that cardiorespiratory fitness is influenced by factors other than the daily habits measured in this study. This study provides an initial overview of the lifestyle and fitness conditions of junior high school students, and can serve as a basis for schools and related parties to develop fitness improvement programs.

How to Cite

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INTRODUCTION

During adolescence, it is very important to start adopting healthy habits, especially for junior high school students who are undergoing rapid development (Sawyer et al., 2018). Therefore, energy requirements, nutrition, and a healthy lifestyle are becoming increasingly important (Patton et al., 2016). Physical health can be affected by irregular eating patterns, lack of physical activity, and sleep (Mahon et al., 2022). This condition shows that the lifestyle of teenagers is very important to understand. Therefore, research is needed to provide an overview of the relationship between diet, physical activity, rest patterns, and fitness in the form of cardiorespiratory endurance in adolescents.

Various studies show that a balanced diet, adequate physical activity, and good rest are related to a person›s fitness level (Fonseca et al., 2021). However, the fact is that modern adolescents prefer to eat fast food and spend more time using gadgets, causing physical activity to decline and sitting time to increase (Kumala et al., 2019; Ra, 2022). These three habits can affect how well the body performs daily activities and exercise, especially endurance. The results show that lifestyle factors play an interrelated role in determining physical fitness (Wilhite et al., 2023). Therefore, these factors need to be analyzed simultaneously in order to provide a better understanding of the three elements.

Most studies investigating the relationship between lifestyle and fitness have been conducted on high school students or adults (Amin & Mustara, 2022). Research on junior high school students is still relatively scarce, even though this age is very important for the formation of habits that will carry over into adulthood (Sawyer et al., 2018). In addition, some studies only look at one aspect of lifestyle, such as diet or physical activity, and therefore do not provide a comprehensive picture of the relationship between fitness (Lubis et al., 2019; Mariany & Maria, 2022). The limitations of this study allow for more comprehensive research on junior high school adolescents to understand the relationship between diet, physical activity, and sleep patterns with fitness, which in this study focused on cardiorespiratory endurance.

Thus, the purpose of this study is to determine the relationship between diet, physical activity, and rest patterns with the fitness of junior high school adolescents. It is hoped that the results of this study will assist schools, parents, physical education teachers, and other parties in developing programs or strategies to improve fitness through healthier lifestyle habits. In addition, the purpose of this study is to contribute to the scientific literature on factors that influence the fitness of junior high school students. This will serve as a basis for further research and broader interventions, which will be discussed in the next section.

METHOD

This study uses a cross-sectional study, where data collection is conducted at one time to see the description of each variable simultaneously. This approach is used to determine the relationship between diet, physical activity, rest patterns, and physical fitness in students without conducting long-term observations. This method allows for direct analysis of the relationship between variables in accordance with the research objectives because all data is collected at the same time. The research was conducted at junior high school 1 Panggarangan, located in Lebak Regency, Banten Province. The school environment was chosen as the research site because the population was suitable for the research objectives and easily accessible during the data collection process. All research procedures, from questionnaire completion to physical fitness measurements, were conducted at the school in November 2025. The participants in this study were eighth and ninth grade students aged 13-16 years old. To meet research needs, purposive sampling techniques were used to select samples. Inclusion criteria involved active students aged 13-16 years, enrolled as students at junior high school 1 Panggarangan, and obtained permission from parents or guardians to participate in the study. Exclusion criteria include students with a history of illness or injury that hinders physical activity, students who are sick at the time of fitness assessment, and students whose questionnaire data is incomplete. There were 60 students who met all the criteria based on the selection process.

This study has four variables, namely diet, physical activity, and rest patterns as independent variables, and fitness as a dependent variable. Standardized instruments were used to measure each variable. Dietary patterns are assessed through daily eating habits and food choices, physical activity is measured by the frequency and intensity of activities performed during one week, rest patterns are assessed through sleep quality and duration, and fitness tests measure the body's ability to perform physical activities

gradually, reflecting aerobic endurance (Marques et al., 2019). In this study, data were collected using paper forms that were distributed directly to all participants. Under the supervision of the researchers in this study, each student completed the questionnaire independently. This is done to ensure that the filling process is carried out correctly and that students do not make mistakes in understanding each question. Dietary patterns were measured using the Adolescent Food Habits Checklist (AFHC). This instrument lists 23 statements to assess adolescents' eating habits that reflect healthy eating habits (Johnson et al., 2002). In this study, the AFHC instrument was retested and translated into Indonesian by language experts and found to be reliable with a Cronbach's alpha value of 0.747, making it suitable for measuring students' eating patterns. Physical activity was measured using the International Physical Activity Questionnaire (IPAQ), which had been tested for validity and reliability by previous researchers with a Cronbach's alpha value of 0.884 (Dharmansyah & Budiana, 2021). Therefore, this instrument can be used to measure the intensity and frequency of student activities during the past week. Rest patterns were measured using the Pittsburgh Sleep Quality Index (PSQI), an instrument that assesses the quality, duration, and other elements of sleep that affect daily activities. The PSQI used is appropriate for assessing students' sleep patterns in this study because it has been proven valid and reliable based on previous studies with a Cronbach's alpha value of 0.72 (Setyowati & Chung, 2021). The beep test or multistage fitness test (mft) measures aerobic capacity by running back and forth to the rhythm of beeps using audio from a special application that generates beeps to ensure accuracy and consistency of rhythm during measurement (Leger & Lambert, 1982). Next, the values obtained are converted into estimated VO2max using the standard formula (Leger & Lambert, 1982; Mayorga-vega et al., 2015) for adolescents.

Several measures were taken to reduce bias in this study. To ensure consistency in the procedure, physical fitness measurements were conducted on all participants by the same tester. The questionnaire was distributed directly to all students to avoid misunderstandings. All questionnaires were double-checked to ensure no data was missing. In addition, all measurements were taken at the same time to ensure that all participants were in the same place. This study sampled 60 students, which is sufficient for a cross-sectional study in a school setting (Althubaiti, 2023). The determination of the sample size took into account the availability of students who met the inclusion criteria and the ability to perform relationship analysis in analytical research. This number is considered to represent the situation of eighth and ninth grade students at junior high school 1 Panggarangan.

Data analysis begins with descriptive statistics to describe each variable, spearman correlation test to determine the relationship between variables, and multiple linear regression was performed to assess the contribution of diet, physical activity, and rest patterns to fitness. All data were processed using SPSS, and the significance level was set at $\alpha = 0.05$.

RESULTS AND DISCUSSION

This study aims to determine the relationship between diet, physical activity, and rest patterns with fitness focused on the cardiorespiratory endurance of junior high school students The results of the descriptive analysis in **Table 1** show that the dietary pattern variable has an average value of 9.87 and a standard deviation of 3.92. The physical activity variable has an average value of 248.92 and a standard deviation of 90.73. For the rest pattern variable, the average value is 5.27 and the standard deviation is 2.77. The fitness variable shows an average value of 56.53 and a standard deviation of 0.209. and the correlation test results show that diet has a significant relationship with physical activity with $p = 0.008$. This value indicates that the better the students' diet, the higher their physical activity level. Other correlation test results show that diet has no significant relationship with rest patterns ($p = 0.882$) or physical fitness ($p = 0.158$). Physical activity showed no significant relationship with rest patterns ($p = 0.731$) or physical fitness ($p = 0.924$). Rest patterns also had no significant relationship with physical fitness ($p = 0.813$). Thus, only diet and physical activity showed a significant correlation among all variables studied.

Table 1. Correlation test

Variable	n	M	SD	1	2	3	4
Diet	60	9.87	3.92	-			
Physical Activity	60	248.92	90.73	.008	-		
Rest Patterns	60	5.27	2.77	.882	.731	-	
Fitness	60	56.53	.209	.158	.924	.813	-

Note. Values resresent p-values from Spearman Correlation tests. Significant was set a $p < 0.05$.

The **Table 2 & Table 3** regression test results show that the three independent variables, namely diet, physical activity, and rest patterns,

produce an R value of 0.261, indicating that the combined contribution of the independent variables to fitness is still low. The R Square value is recorded at 0.068, which means that it only explains about 6.8% of the variation in fitness. The Adjusted R Square value is 0.018 with a standard error estimate of 0.207. In the partial test results, diet obtained a significant value of 0.325, physical activity 0.069, and sleep patterns 0.767, so that none of the three had a significant effect on fitness at a significance level of 0.05.

Table 2. Multiple linear regression test

Effect	Estimate	SE	95% CI		P	Interpretation
			LL	UL		
Diet	-.007	.007	-.022	.007	.325	Not Significant
Physical Activity	.001	.000	.000	.001	.069	Not Significant
Rest Patterns	-.004	.010	-.024	.015	.767	Not Significant

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error	Interpretation
1	.261a	.068	.018	.207	Model Not Significant

The results of the study indicate that dietary patterns have a significant correlation with physical activity in adolescents. The theory that a healthier diet can provide sufficient energy to support participation in physical activity (Rosi et al., 2025) in line with these findings. Adolescents Teenagers who consume nutritious foods such as carbohydrates, protein, fruits, and vegetables tend to have more stable energy reserves, making them more prepared and energetic to move. Healthy foods also help maintain stable blood sugar levels and improve focus, which makes it easier for students to engage in physical activity without getting tired easily (Capra et al., 2024). Previous studies have also found that adolescents who have healthy eating patterns tend to have higher levels of physical activity, and that active adolescents have better quality eating patterns. However, the study used more detailed measurements of nutritional intake (Summer et al., 2022), whereas this study used AFHC, which only assessed general eating habits. The differences between these instruments mean that the relationships found in this study describe habitual patterns rather than detailed nutritional quality.

However, this study found no relationship between diet and fitness. These findings are inconsistent with several previous studies that found that good nutrition contributes to physical performance. These findings are inconsistent with several previous studies that found that good nutrition contributes to physical performance (Ilman Nafi et al., 2025). These differences in results may be due to previous studies using more comprehensive nutritional measurements such as daily calorie analysis or protein and micronutrient assessment (Oukheda et al., 2023). Meanwhile, this study was conducted on junior high school students in public schools with irregular physical activity. Other factors such as exercise intensity, motivation to exercise, and health conditions were not specifically controlled for, so the relationship between diet and fitness was not apparent in this study.

The results also showed that there was no significant relationship between physical activity and fitness levels. This contradicts the theory that sufficient physical activity can increase aerobic capacity (Silva et al., 2022). These differences in results may be due to the measurement method. In this study, physical activity was measured using the IPAQ, which is a self-report instrument and therefore prone to bias, as students may overestimate or underestimate the duration of their activities. Previous studies that found significant correlations used objective tools such as accelerometers, which can accurately measure the intensity and duration of activities (de Moraes Ferrari et al., 2020). In addition, students' daily physical activity may not be intense enough or performed for a sufficient duration to affect the results of the beep test, which measures specific endurance.

This study also shows that there is no significant relationship between sleep patterns and fitness levels. In theory, the quality of sleep affects recovery and physical performance (Kong et al., 2025). However, previous studies used more in-depth sleep measurement methods such as sleep diaries or actigraphy, which assess sleep patterns objectively (Castiglione-Fontanellaz et al., 2022). In this study, sleep patterns were assessed using the subjective PSQI, so variations in sleep quality were not accurately reflected. External factors such as gadget use, schoolwork, and stress, which were not measured, also had the potential to affect junior high school students' sleep quality.

In addition, the regression analysis results show that diet, physical activity, and sleep patterns do not have a significant effect on fitness. These three factors cannot yet be considered as influencing fitness based on the data in this study, because diet, physical activity, and sleep patterns do not significantly explain the differences in fitness levels. Even so, physical activity appears to have the most dominant influence compared to the other two variables, although it remains insignificant. This means that the better a person's physical activity, the better their fitness tends to be, but the relationship is not strong enough to

be statistically significant. These differences in results compared to previous studies may be due to variations in samples and measurement methods. The study reports the relationship between lifestyle (diet, physical activity, and rest patterns) and fitness measured using a multi-component approach that includes cardiorespiratory fitness, muscle strength, flexibility, and power, using detailed dietary instruments such as 24-hour food recall or FFQ, which produce more consistent results (Alosaimi et al., 2023; Drenowatz & Greier, 2018; Ferozi et al., 2024). Meanwhile, this study only assessed endurance through the beep test, so it is highly unlikely that it identified additional fitness elements influenced by lifestyle patterns.

Overall, this study shows that adolescent lifestyle patterns do not always show a direct relationship with fitness, especially when measured using self-report instruments. Fitness is the result of many factors, such as nutritional status, planned physical activity, high exercise intensity, and psychological problems (Ferozi et al., 2024), all of which have not been discussed in this study. This study has several limitations, such as the use of self-report instruments, which can cause perception bias. The variables used also did not include other factors such as nutritional status, structured exercise habits, or exercise frequency, which may have a stronger relationship with fitness.

However, this study provides important insights into the lifestyle patterns of junior high school students and their health in relation to physical fitness. These findings can serve as a basis for schools and relevant parties to teach students about nutrition, provide regular physical activity programs, and help students improve their lifestyle habits. For further research, it is recommended to use objective measurements and involve more variables. To provide a more in-depth picture of the relationship between variables, it is recommended to use a longitudinal design.

CONCLUSION

This study shows that junior high school students' lifestyles play different roles in their physical activity habits and fitness levels. A healthier diet appears to be associated with a tendency for students to be more physically active, suggesting that good eating habits can support energy levels in daily activities. However, this study also found that diet, physical activity, and rest patterns do not have a strong influence on fitness as measured by cardiorespiratory endurance. Although physical activity tends to have a more dominant influence than other variables, the results are still not significant. This illustrates that the fitness of junior high school students is influenced by factors that are broader than just daily lifestyle.

This confirms that efforts to improve student fitness are not sufficient through dietary improvements or increased daily physical activity alone, but must also consider other aspects such as planned exercise intensity, nutritional status, and the school environment and structured exercise habits. In addition, the use of self-report instruments and non-standardized physical activities may be one reason why the relationship between variables did not appear strongly in this study. This study provides an initial overview of the lifestyle and fitness conditions of junior high school students and can serve as a basis for schools and physical education teachers to design more specific programs to improve student health and fitness.

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