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Healthy Lifestyle and Physical Activity of Pesantren Students

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ABSTRACT

Background: Physical activity is recognized as a domain of urgent importance for adolescent health. However, the relationship between activity and a healthy lifestyle does not always show consistent patterns across different environmental perspectives. Empirical studies examining the relationship within structured environments such as boarding schools are relatively limited. Therefore, this study aimed to explore the relationship between physical activity and a healthy lifestyle among students at Islamic boarding schools.
Methods: A cross-sectional design was employed, involving 40 twelfth-grade students residing at Al-Masoem Islamic Boarding School. Physical activity was measured using the Global Physical Activity Questionnaire (GPAQ), while healthy lifestyle was assessed with the Health-Promoting Lifestyle Profile II (HPLP-II). Data analysis included descriptive statistics, Spearman correlation tests, and comparisons based on gender, body mass index, and frequency of returning home.
Results: The results indicated a significant and strong positive relationship between physical activity and overall healthy lifestyle ($\rho = .696$, $p < .01$). Although physical acitivy differed significanly by gender ($p = .026$), no significant differences were found in physical activity or healthy lifestyle based on body mass index categories or frequency of returning home.
Conclusions: Physical activity was significantly associated with healthy lifestyle among boarding school students, highlighting the influence of the structured boarding school environment on adolescent health behaviors. However, the findings should be interpreted cautiously due to the small sample size and the use of convenience sampling..

Keywords: physical activity; healthy lifestyle; structured environment; islamic boarding school; adolescent.

1. Background

Physical activity is one of the main determinants of adolescent health and is consistently associated with improved physical fitness and psychological well-being (Rakesh, 2024). Adolescents' regular engagement in physical activity has also been reported to contribute to a reduced risk of various health risk factors later in life (Li & Han, 2024). Beyond physiological benefits, physical activity during adolescence plays a crucial role in shaping health behaviors that can persist into adulthood (Aira et al., 2023).

However, adolescent health is not solely determined by physical activity as a single behavior; it is influenced by a combination of various behaviors that collectively form an overall healthy lifestyle (Pender et al., 2015). A healthy lifestyle is understood as a multidimensional construct encompassing physical activity, nutrition, health responsibility, interpersonal relationships, stress management, and personal development (Moraes, 2024). Several empirical studies have shown a positive relationship between physical activity levels and healthy lifestyle among adolescents. For instance, Şimşek & Ballıel (2022) found a significant relationship between physical activity levels and Health-Promoting Lifestyle Behaviors (HPLP). Similarly, Marques et al. (2020) and Reyhan Yalçına (2023) confirmed empirical evidence of a positive relationship between physical activity levels and healthy lifestyle among adolescent populations.

Adolescents with higher physical activity levels tend to exhibit higher overall healthy lifestyle scores (Marques et al., 2020; Reyhan Yalçına, 2023). Physical activity is also linked to increased health awareness and the adoption of health-supportive behaviors (Li & Han, 2024). These findings support the view that physical activity

can potentially act as a triggering behavior for other healthy lifestyle behaviors (Mitchell, 2022). Nevertheless, the relationship between physical activity and healthy lifestyle does not always show consistent patterns across different contexts. Some studies report that individuals with high physical activity levels do not necessarily maintain optimal healthy behaviors in other dimensions, such as nutrition and stress management (Warnier-medina et al., 2024).

The environmental context in which adolescents live plays an important role in shaping the relationship between physical activity and a healthy lifestyle (Rosis & Corazza, 2020). Structured environments may promote regular physical activity but can simultaneously limit individual autonomy in choosing other health behaviors (Li & Han, 2024). Boarding schools, such as Islamic boarding schools (Pesantren), are examples of organized environments where adolescents live, engage in academic activities, and interact within the same institution. These environments refine collective routines, institutional guidelines, and peer social interactions, which may influence health-related behaviors differently than those observed in students enrolled in conventional day schools. (Noll et al., 2020; Rochmawati & Retno Rahayu, 2017). Despite boarding school students representing a significant population, empirical studies examining the relationship between physical activity and healthy lifestyle among adolescents remain limited in certain formal education contexts (Sigvartsen et al., 2016). This lack of empirical evidence highlights a research gap that needs to be addressed to understand health behavior dynamics in boarding school environments, which possess structural and social characteristics different from non-boarding schools (Noll et al., 2020).

Based on this discussion, the present study has both theoretical and practical relevance. Theoretically, it contributes to testing the relationship between physical activity and healthy lifestyle in the context of a structured environment. Practically, the findings are expected to provide a basis for developing more contextualized health promotion programs for boarding school students. Therefore, this study aims to analyze the relationship between physical activity levels and healthy lifestyle among boarding school students using a cross-sectional design.

2. Methods

This study employed a cross-sectional design to analyze the relationship between physical activity levels and healthy lifestyle among boarding school students. This design allows measurements to be conducted simultaneously at a single observation point without making causal inferences (Levin, 2006). The study was conducted at Al-Masoem Islamic Boarding School on December 19, 2025. The research population comprised 91 twelfth-grade students enrolled in the boarding institution. A convenience sampling methodology was utilized, selecting participants based on their accessibility and availability throughout the data collection phase (Sugiyono, 2013). Despite the relatively limited size of the total population, a comprehensive sampling approach was impractical due to situasional constraints, such as the academic commitments and extracurricular engagements of the students. As a result, only those students who were accessible and expressed a willingness to take part in the study were incorporated, culminating in a final sample size of 40 students.

The Global Physical Activity Questionnaire (GPAQ) was used as an instrument designed to measure individual physical activity (Bull et al., 2009). The GPAQ calculates activity using Metabolic Equivalent of Task (MET). The calculation multiplies the duration of activity (minutes/day) by frequency (days/week). Standard MET values were applied (walking = 3.3; moderate = 4.0; vigorous = 8.0). Total MET-minutes/week were obtained by summing all activity categories (Cleland et al., 2014). Physical activity was classified into high (≥3,000 MET-minutes/week), moderate (≥600 MET-minutes/week), and low (<600 MET-minutes/week) categories (Herrmann et al., 2013; World Health Organization , 2012). The Health Promoting Lifestyle Profile II (HPLP-II) was used to assess the frequency of individual health-promoting behaviors across six dimensions: health responsibility, physical activity,

nutrition, spiritual growth, interpersonal relations, and stress management (Walker et al., 1987; Wei et al., 2012). A Likert scale was used to measure attitudes or behavioral frequency based on the degree of agreement or occurrence (Boone, 2012). HPLP-II scores ranged from 52 to 208 and were categorized into low (<104), moderate (≥104), and high (≥156), as used in previous studies on healthy lifestyle based on HPLP-II (Wei et al., 2012). Respondent characteristics, including gender, frequency of returning home, and body mass index (BMI), were also collected for supporting analyses. BMI was calculated using the formula: body weight (kg) ÷ height (m2). BMI was categorized as underweight (<18.5), normal (18.5–24.9), overweight (25–29.9), and obese (≥30) (Indonesia Ministry of Health, 2020).

All data were collected using Google Forms. To address measurement reliability, validation procedures were implemented. GPAQ is a globally recognized instrument, and HPLP-II has been validated for language, readability, and construct in the Indonesian population. Data collection was supervised by the researchers to ensure consistent understanding of instructions. All data analyses were conducted using SPSS version 27. Correlation tests and subgroup comparisons were performed according to relevant guidelines (Sugiyono, 2013).

3. Results

A total of 40 students participated as respondents in this study, with their characteristics presented in Table 1 and Table 2. In addition, correlation tests are shown in Table 3, and difference tests are presented in Tables 4 through 8.

Table 1. Statistic desriptive

Characteristic	M	SD
Age	17.18	.5
Weight (kg)	60.21	13.44
Height (cm)	163.96	8.54
Body mass index (kg/m^2)	22.3	4.02
GPAQ (*MET-minutes/week*)	4,533.55	4,044.25
HPLP-II	126.85	18.38

Table 2. Frequency descriptive

Characteristic	n	Percentage (%)
Gender		
Boys	25	62.5
Girls	15	37.5
Frequency of returning home		
Every 2 week	2	5
Every 1 month	33	82.5
Every 6 month	5	12.5
Body mass index		
Underweight	7	17.5
Normal	25	62.5
Overweight	5	12.5
Obeses	3	7.5
Physical activity		
Low	11	27.5
Moderate	7	17.5
High	22	55
Healthy lifestyle		
Low	3	7.5
Moderate	35	87.5
High	2	5

Table 3. Relationships between healthy lifestyle and physical activity

Variable	n	Med	IQR	1	2
1. Healthy lifestyle	40	123	24.75	-	
2. Physical activity	40	3,958	7,719.25	.696**	-

noted. testing was performed using spearman's rho; IQR = interquartile range; p < .01.

The test results indicated a strong and significant positive relationship between healthy lifestyle and physical activity (ρ = .696**; p < .01), with approximately 48.44% of the variation in ranks being shared.

Table 4. Different in healthy lifestyle by gender

Variable	Boys (n = 25)		Girls (n = 15)		t(38)	p	cohen's d
	M	SD	M	SD			
Healthy lifestyle	129.04	18.24	123.2	18.65	.97	.337	.32

noted. testing was performed using an independent-samples t test; t(38) = test statistic; p = significance value; cohen's d = effect size; diffrences were considered significant if p < .05.

Table 5. Different in physical activity by gender

Variable	Boys (n = 25)		Girls (n = 15)		U	Z	p	r
	Med	IQR	Med	IQR				
Physical activity	5,874	6,700.5	1,856	5,160	108	-2.23	.026	.35

noted. IQR = interquartile range; testing was performed using the mann-whitney U test; U = test statistic; Z; standard score; p = significance value; r = effect size; differences were considered significant if p < .05.

Table 6. Different in healthy lifestyle by body mass index

Variable	Underweight (n = 7)		Normal (n = 25)		Overweight (n = 5)		Obeses (n = 3)		F (3,36)	p	η²
	M	SD	M	SD	M	SD	M	SD			
Healthy lifestyle	111.1	28.6	128.7	18.5	132.2	22.1	126	15.1	1.6	.2	.1

noted. testing was performed using one-way anova; F(3,36) = test statistic; p = significance value; η² = effect size; differences were considered significant if p < .05.

Table 7. Different in physical activity by body mass index

Variable	Underweight (n = 7)		Normal (n = 25)		Overweight (n = 5)		Obeses (n = 3)		H	df	p
	Med	IQR	Med	IQR	Med	IQR	Med	IQR			
Physical activity	360	6,239	5,160	7,158.5	5,388	6,694.5	1,856	-	2.94	3	.4

noted. IQR = interquartile range; testing was performed using the Kruskal-wallis test; H = test statistic; df = degress of freedom; p = significance value; differences were considered significant if p < .05.

Table 8. Different in healthy lifestyle and physical activity by frequency of returning home

Variable	Every 2 week (n = 2)		Every 1 month (n = 33)		Every 6 month (n = 5)		H	df	p
	Med	IQR	Med	IQR	Med	IQR			
1. Healthy lifestyle	136.5	-	121	22	130	56	1.256	2	.534
2. Physical activity	8,400	-	2,880	6,524	5,532	5,137.5	3.638	2	.162

noted. IQR = interquartile range; testing was performed using the kruskal-wallis test; H = test statistic; df = degrees of freedom; p = significance value; differences were considered significant if p < .05.

4. Discussion

Relationship between physical activity and healthy lifestyle

This study aimed to analyze the relationship between physical activity and healthy lifestyle among boarding school students, representing a structured educational environment. The results indicated a strong positive relationship between physical activity levels and healthy lifestyle. These findings align with previous studies reporting that physical activity plays a critical role in adolescent health promotion systems and is often associated with other health-related behaviors (Chen et al., 2020; Marques et al., 2015). Regular physical activity is known to contribute to multiple aspects of health, including physical fitness, mental well-being, and increased awareness of healthy lifestyle practices (Rodriguez-Ayllon et al., 2019). Therefore, the observed positive relationship in this study reinforces the view that physical activity is a core component in shaping adolescents' health behaviors.

The unexplained portion of variance may reflect contributions from unmeasured psychosocial and contextual factors, such as intrinsic motivation, self-efficacy, perceived autonomy, and social support. Previous literature highlights the importance of these psychological factors in the adoption and sustainability of healthy behaviors, particularly during adolescence (Patton et al., 2016; Teixeira et al., 2012). In the context of pesantren, which have highly structured daily schedules, physical activity patterns may develop primarily through adherence to institutional routines, rather than through personal internalization of healthy lifestyle values. Moreover, a healthy lifestyle is a multidimensional construct encompassing aspects such as nutrition, stress management, health responsibility, and interpersonal relationships, which do not always align with physical activity levels (Pearson et al., 2009; Walker et al., 1987). Therefore, increased physical activity does not automatically represent overall healthy lifestyle quality.

Differences healthy lifestyle and physical activity by gender

The study found significant differences in physical activity levels based on gender. This finding is consistent with global evidence showing that male adolescents tend to be more physically active than female adolescents, often linked to biological, social, and cultural factors (Dumith et al., 2011; Guthold et al., 2020). However, this gender-based difference should be interpreted in light of the uneven distribution of participants between male and female students. Although statistically significant, the smaller sample size for females may affect the sensitivity of statistical tests in detecting variations in physical activity. Therefore, the findings indicate a tendency for males to be more physically active, but the magnitude of the difference should be interpreted cautiously.

Interestingly, differences in physical activity by gender were not accompanied by significant differences in overall healthy lifestyle. This suggests that in the pesantren environment, the influence of individual characteristics such as gender on healthy lifestyle is likely reduced by collective norms, rules, and routines. This phenomenon aligns with the concept of the contextual suppression effect, where individual factors lose discriminative power due to dominant structural environmental factors (Bonell et al., 2013; Langford et al., 2014). Thus, while differences exist in one dimension of health behavior, the overall quality of healthy lifestyle appears relatively homogeneous across students.

Differences healthy lifestyle and physical activity by body mass index

No significant differences in physical activity or healthy lifestyle were observed across Body Mass Index (BMI) categories. These findings support the view that BMI is not a direct indicator of daily health behaviors, particularly in adolescent populations (World Health Organization, 2021). Adolescent nutritional status is influenced by complex interactions between genetic, metabolic, energy intake, sleep quality, and psychosocial stress factors, which are not fully captured by self-reported physical activity or HPLP-II-based healthy lifestyle measures (Kurniawan et al., 2023). Within the pesantren context, relatively uniform and standardized physical activity may

produce a masking effect, whereby variations in health behaviors are not clearly reflected in differences in nutritional status. These results suggest that the relationship between physical activity, healthy lifestyle, and BMI is complex and non-linear, requiring a multidimensional approach to fully understand (Men et al., 2025).

Differences healthy lifestyle and physical activity by frequency of returning home

The absence of significant differences in physical activity and healthy lifestyle based on frequency of returning home should be interpreted carefully from both statistical and contextual perspectives. The highly uneven distribution of participants across returning-home categories may reduce the statistical power of the tests, meaning that small or moderate differences could remain undetected. Beyond statistical limitations, this finding may also reflect the strong role of the pesantren as the primary ecological context in shaping students' health behaviors. Standardized daily routines and consistent regulations may reduce the influence of family environment variations, so differences in returning-home frequency are not strongly reflected in indicators of physical activity or healthy lifestyle (Glanz et al., 2008; Naylor et al., 2015).

Limitations and findings

This study demonstrates that physical activity is strongly associated with healthy lifestyle among boarding school students. However, this relationship does not fully reflect the intrinsic internalization of healthy lifestyle practices, indicating that adolescent health behaviors are influenced by complex interactions among individual, psychosocial, and environmental factors. This study has several limitations. The cross-sectional design does not allow causal inferences, and the use of self-report instruments may introduce reporting bias. In addition, the relatively small sample size and the use of convenience sampling may limit the external validity of the findings. Psychosocial factors such as intrinsic motivation, self-efficacy, and social support were also not included in the analysis. Despite these limitations, the findings have important implications for health promotion in pesantren and boarding school settings. Health programs should not only increase structured physical activity but also incorporate psychosocial strategies that encourage intrinsic motivation and sustainable healthy lifestyle practices. Future studies are recommended to employ larger samples and more robust research designs to further examine adolescent health behaviors in boarding school environments.

5. Conclusions

This study concluded that physical activity is significantly associated with a healthy lifestyle among Islamic boarding school students. However, this did not extend to other health behavior domains. High levels of physical activity in Islamic boarding school environments tend to develop structurally and situationally and are not always accompanied by sustained internalization of healthy lifestyle values and practices. These findings highlight the importance of institutional environmental factors in shaping adolescent health behaviors. From a practical perspective, Islamic boarding school administrators should complement structured physical activity programs with health promotion strategies that encourage students' intrinsic motivation, health awareness, and long-term healthy lifestyle practices. However, these findings should be treated with caution due to the relatively small sample size and the use of convenience sampling. Future studies are recommended to use larger samples and more robust research designs to further examine healthy lifestyle behaviors in Islamic boarding school environments.

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