

Body Image, Physical Activity, Nutrition Knowledge, and Nutritional Status Among Boarding and Non-Boarding Students

Kartika Pibriyanti^{1*}, Firda Sabilatun Nabilah¹, Hafidhotun Nabawiyah¹,
Lulu' Luthfiya¹ and Susi Nurohmi²

¹Department of Nutrition, Faculty of Health Sciences, Universitas Darussalam Gontor, Ponorogo, Indonesia

²Department of Nutrition, Faculty of Nutrition, University of Muhammadiyah Kudus, Kudus, Indonesia

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Abstract: **Introduction:** Adolescence is a critical period vulnerable to nutritional problems. The environment in which adolescents live can significantly impact various aspects such as body image, lifestyle, and nutritional status. This study aimed to analyze differences of subject characteristics in the forms of body image, physical activity level, nutritional knowledge and nutritional status in two different environment (boarding school and non-boarding school). **Methods:** A cross-sectional design was employed for this study, involving a total of 120 adolescent girls, divided equally into two groups (boarding school and non-boarding school), with each group comprising 60 subjects. Eligible subjects were female students aged 16 to 18 years, in good health, and willingly participating in the study. Data analysis used Independent Sample T Test or Mann-Whitney test. **Results:** The majority of subjects were 16 years old. Both the boarding school group (60.00%) and the non-boarding school group (51.67%) exhibited negative body image among most subjects. In the boarding school group, 85.00% of subjects demonstrated a moderate level of physical activity, while in the non-boarding school group, 58.33% of subjects reported engaging in a heavy level of physical activity. Moreover, a significant proportion of subjects in both the boarding school group (73.33%) and the non-boarding school group (60.00%) possessed low nutritional knowledge. The analysis comparing the two groups indicated a significant difference in variables of physical activity and nutritional knowledge (p-value <0.05). **Conclusion:** The level of physical activity and nutritional knowledge in adolescent girls living in boarding schools and non-boarding schools showed significant differences. However, no significant differences were observed in terms of body image and nutritional status between the two groups. Consequently, there is a compelling need for curricular integration focusing on balanced nutrition knowledge and promoting increased physical activity within the school environment.

1 INTRODUCTION

Adolescence is one of the vulnerable periods for nutrition issues (E. R. Damayanti, 2022). According to Indonesia Basic Health Survey (2018), malnutrition among adolescents aged 16-18 years in Indonesia has increased, with the prevalence of overweight in 2013 being 7.3% and increased to 13.5% in 2018 (Kemenkes RI, 2018). East Java was one of the provinces having overweight problems in the age group of 16-18 years old. The prevalence of overweight in the age group 16-18 years is above the national trend, with a prevalence of 21.2% (Kemenkes RI, 2017)

Nutrition issues among adolescents were currently found at school or boarding school. Based on the research among Darussalam Islamic Boarding

School students staying in boarding school, the proportion of overweight was found to be 14% (A. Y. Damayanti, 2020). Meanwhile, research among adolescents in the Public Junior High school of Wungu Madiun in 2019 had a prevalence of 8.3% in the category of overweight (Hamdani, 2019). The Nutritional status of adolescence was the result of eating patterns and behaviors which was influenced by many factors, including peer influences, parental modeling, food availability, food preferences, cost, convenience, personal and cultural beliefs, mass media, and body image (Das et al., 2017)

There are many changes during puberty, both physically and psychologically, but physical changes are more noticeable. As a result, adolescents pay more attention to their body shape and body image (Normate et al., 2017). Adolescents living in boarding

school will often interact with their peers, so they tend to compare themselves with their peers. Those staying with parents but lacking in caregiving and support are insecure regarding their body image (Bearman et al., 2006).

Physical activity generally results in increasing energy and has a positive effect on the degree of human health (Singh et al., 2014). Adolescents living at home and boarding school have different activities. Those living at home have more flexible activities and conditional rules. While those living in boarding school have scheduled activities and rules that should be followed. Physical activity among adolescents has now decreased (Suntiah et al., 2020). They mostly enjoy accessing the internet and are physically inactive (Rukmana et al., 2021). The environment can affect how a person gets information. Individuals who live in dormitories or boarding schools get more information from the library that has been provided. Meanwhile, individuals who live at home can access the internet flexibly because there are no regulatory restrictions that prohibit the use of the internet (Juliana, 2019). Thus, this study aimed to analyze differences in subject characteristics in the forms of body image, physical activity level, nutritional knowledge and nutritional status in two different environments (boarding school and non-boarding school).

2 METHOD

A cross-sectional study was conducted with senior high school girl students in grades 10, 11, and 12 from Pondok Pesantren Miftahul Jannah for boarding students and SMK Muhammadiyah 2 Ngawi for non-boarding students. Convenience sampling was used in this research with inclusion criteria from healthy students aged 16-18 years old while exclusion criteria were unhealthy students and those who did not have any consent to participate. Total students participating were 120 (60 students from boarding school and 60 students from non-boarding school).

Body image was measured by completing the Body Appreciation Scale (BAS) Questionnaire (Ko et al., 2012) containing 10 questions and scoring 5 levels of answers (never, rarely, sometimes, often, always). Body image scoring level was classified as positive (BAS hypothetical score ≥ 46) and negative (BAS hypothetical score < 46). Physical activity level was measured by answering the International Physical Activity Questionnaire (IPAQ) consisting of 7 questions about the time spent being physically

active in the last 7 days (Edward MK & Loprinzi PD, 2019). Physical activity levels are classified as low (≤ 600 MET minutes/week), moderate ($> 600 - \leq 3000$ MET minutes/week), and heavy (> 3000 MET minutes/week). Measurement of nutrition knowledge was conducted by answering multiple-choice questions that had been validated. Total of 20 questions had been tested and there were 5 invalid questions. The remaining 15 questions were tested for reliability and showed Cronbach's alpha value of 0.929. Nutrition knowledge is classified as low ($< 60\%$), moderate (60-80%) and high ($> 80\%$) (Khomsan A, 2022). Assessment of nutrition status was using measurements of z-score (BMI for age) classified as malnutrition ($< -3SD$), underweight ($-3SD$ to $< -2SD$), normal ($-2SD$ to $+1SD$), overweight ($+1SD$ to $+2SD$), and obese ($> +2SD$) (Kemenkes RI, 2020).

Data analysis was carried out to determine the means, standard deviations, and categorical data (frequency and percentage) distribution of each variable in each group. Comparative analysis was used to find the difference between the two independent groups. Independent Sample T Test was used for normal data distribution while Mann Whitney was used conditionally if the Independent Sample T Test didn't fit for variable because the data was not normally distributed.

3 RESULTS AND DISCUSSION

The majority of respondents aged 16 years old were both boarding students (73.3%) and non-boarding students (46.7%). The average non-boarding students' allowance was Rp 150000-Rp 300000 per month (70%) while boarding students' is Rp 150000 to Rp 500000 per month. The majority of father's occupation of boarding students was self-employed (73.3%) while father's occupation of non-boarding students is farmer (56.7%). Most of the mother's occupation was a housewife in both groups. The majority of father's education of boarding students is junior high school (38.3%) while the father's education of non-boarding students is elementary school (53.3%). Most of the mother's education of both students is junior high school.

Table 1: General characteristics of respondents.

Characteristic	n (%)	
	Boarding Students	Non Boarding students
Age (years old)		
16	44(73.3)	28(46.7)
17	11(18.3)	19(31.7)
18	5(8.3)	13(21.7)
Allowance (IDR)		
150000-300000	27(45.0)	42(70.0)
400000-500000	27(45.0)	13(21.7)
600000->1000000	6(10.0)	5(8.3)
Father's occupation		
Farmer	15(25.0)	34(56.7)
Self-employed	44(73.3)	26(43.3)
Mother's occupation		
Farmer	12(20.0)	16(26.7)
Housewife	35(58.3)	33(55.0)
Self-employed	8(13.3)	11(18.3)
Father's education		
Elementary school	15(25.0)	32(53.3)
Junior high school	23(38.3)	19(31.7)
Senior high school	22(36.7)	9(15.0)
Mother's education		
Elementary school	1(1.7)	8(13.3)
Junior high school	32(53.3)	32(53.3)
Senior high school	27(45.0)	20(33.3)

Table 2 showed that most adolescent girls in both groups had a negative body image. Early to late teens had decreased satisfaction with self-image confidence. This was because adolescents would often compare themselves with other people's personalities (Novida, 2021). This was in contrast to the research of Yusintha (2018) stated that adolescent girls had more positive body image (80.6%) compared to negative body image (19.4%) (Yusintha & Adriyanto, 2018). This difference could be caused by the influence of peer groups and environment with high interaction through words, norms, and criticism of the individual. The highest percentage of physical activity among boarding students was moderate physical activity (85.0%) while non-boarding school students was heavy (58.33%). Non-boarding students tend to have a heavy level of physical activity. The physical activity of non-boarding students was more

flexible than boarding students due to scheduled activity at boarding school. Mulyati et al. (2019) stated that the physical activity of adolescents tend to be light because almost all activity done was learning at school. There were several factors Influencing physical activity such as physiological, environmental, social and demographic factors (Mulyati, Hepti ; Ahmil ; Mandola, 2019).

Table 2: Frequency distribution of categorical variables.

Variables	n (%)	
	Boarding Students	Non-Boarding Students
Body Image		
Negative	36 (60.00)	31 (51.67)
Positive	24 (40.00)	29 (48.33)
Physical activity		
Moderate	54 (90.00)	25 (41.67)
Heavy	6 (10.00)	35 (58.33)
Nutritional knowledge		
Low	44 (73.33)	36 (60.00)
Moderate	16 (26.67)	22 (36.67)
High	0 (0.00)	2 (3.33)
Nutritional status		
Underweight	0 (0.00)	3 (5.00)
Normal	47 (78.33)	44 (73.33)
Overweight	11 (18.33)	7 (11.67)
Obese	2 (3.34)	6 (10.00)

The majority of adolescents in both groups had low level of nutritional knowledge. This is different from the research of Nurwijayanti et al. (2019) and Ningrum et al. (2022) that showed a good level of nutritional knowledge (Nurwijayanti et al., 2019) (Ningrum et al., 2023) . These differences might be caused by educational background, opportunities and access to nutrition information (Ningrum et al., 2023). 18.33% of respondents in boarding school were overweight. The percentage of obese respondents in non-boarding (10.00%) school was more than boarding schools (3.34%). More than 70% of respondents in both groups had normal nutritional status. This finding was consistent with Jayanti and Novananda (2017) who found most adolescents had good nutritional status (Dwi Jayanti & Elsa Novananda, 2019).The result of this study was no significant difference in body image between boarding school and non-boarding school students with p-value = 0.419 (>0.05). Most of the subjects had negative body image. This finding was in line

with the research of Fadillah (2022) which stated that there were no significant difference in the body image of adolescents. The majority of students had negative body image (Fadillah, 2022). On the other hand, the research of Bimantara et al. (2019) showed that most adolescent students had positive body image (Muhammad Dimas Bimantara et al., 2019). This negative body image of some students was influenced by various factors such as mass media, education level, and family. Most of them considered their bodies are too thin compared to the body shape they wanted, and some of them considered their body are too fat. This situation then caused the majority of respondents to have a negative body image (Fadillah, 2022).

Table 3: The average and standard deviation of variables.

Variables	Mean ± SD		p-value
	Boarding School	Non-Boarding School	
Body image ^a	39.18±6.82	40.17±6.46	0.419
Physical activity level ^b	1766.40±831.40	3229.33±798.46	0.000*
Nutritional knowledge ^b	48.82±9.98	52.87±11.79	0.048*
Nutritional status ^b	22.36±3.24	22.02±4.93	0.134

^a) Independent sample t test; ^b) Mann Whitney; *) Significantly different with 95% confidence level

There was a significant difference in physical activity levels in both groups with p-value = 0.048 (<0.05). The physical activity level of boarding students was lower than non-boarding students. This was in line with previous research by Firmansyah et al. (2020) which stated that the majority students in boarding schools had low level of physical activity (Firmansyah et al., 2022). Increasing physical activity by additional programs conducted by school management is needed so that schools can provide students for example with 60 minutes or more of vigorous- or moderate-intensity physical activity per day. These were neither equivalent to nor a replacement for physical education, and both could impact meaningfully the development of healthy, active students (Kohl HW et al., 2013)

The results of this study showed that nutritional knowledge was significantly different between boarding school students and non-boarding school students (p-value<0.05). Although both groups were in the moderate category of nutritional knowledge, the non-boarding school group had a higher value than the boarding school group. This finding was

aligned with previous research showing that 99% of students had insufficient nutritional knowledge (Indriasari et al., 2020). The study by Rimbawan et al. (2023) suggested that intervention in diet and education could effectively improve nutrition knowledge, attitudes, and practices (Rimbawan et al., 2023).

The average BMI for age was normal. Nutritional status in both groups showed no significant difference. There were 5% underweight students in the non-boarding school group while more than 20% overweight and obese in both groups. This was in line with some research that there were no significant differences in nutritional status among respondents staying at boarding school or non-boarding school (Alfitasari et al., 2019)(Fitri et al., 2021).

This study has limitations in terms of intake or eating habits of adolescents. Dietary intake or eating habits are factors that directly affect nutritional status of adolescents. So that, there is a need for research that examines how dietary intake or eating habits and other variables are related to nutritional status.

4 CONCLUSIONS

The level of physical activity and nutritional knowledge in adolescent girls living in boarding school and non-boarding school showed significant differences. The physical activity level of boarding students was lower than the non-boarding students. Both groups were in the moderate category of nutritional knowledge, but the non-boarding school group had a higher value than the boarding school group. No significant differences were found in body image and nutritional status between the two groups. Most of the subjects had negative body image and the average nutritional status using an indicator of BMI for age was normal. From the results of this study, there is a need for curriculum integration related to balanced nutrition knowledge and increased physical activity at school.

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