

The Association of Restrained Eating, Obesogenic Food Consumption, Physical Activity, and Body Image with Overweight Among Adolescents at SMPN 1 Kelapa Dua Tangerang

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ABSTRACT

Overweight among adolescents is a public health concern due to its increasing prevalence, rising globally from 8% to 20% among individuals aged 5–19 years. This condition increases the risk of persistence into adulthood and the development of non-communicable diseases. Besides dietary patterns and physical activity, behavioral factors such as restrained eating, obesogenic food consumption, and body image are considered to influence overweight. However, studies examining these factors among junior high school adolescents remain limited. This study aimed to analyze the relationship between restrained eating, obesogenic food consumption, physical activity, and body image with the incidence of overweight among adolescents. A cross-sectional design was conducted involving 75 eighth-grade students of SMPN 1 Kelapa Dua Tangerang selected using proportionate stratified random sampling. Restrained eating was assessed using the Dutch Eating Behavior Questionnaire (DEBQ), obesogenic food consumption using a Food Frequency Questionnaire (FFQ), physical activity using the Physical Activity Questionnaire for Adolescents (PAQ-A), and body image using the Body Shape Questionnaire (BSQ). Nutritional status was determined based on BMI-for-age (BMI/A). Bivariate analysis was performed using the Chi-Square test. The results showed significant associations between restrained eating ($p=0.001$; OR=14.025; 95% CI=3.847-51.126) and body image ($p=0.001$; OR=119.167; 95% CI=13.183-1077.203) with overweight. Meanwhile, obesogenic food consumption ($p=1.000$) and physical activity ($p=0.335$) were not significantly associated. In conclusion, restrained eating behavior and body image are important factors related to adolescent overweight. Therefore, school-based nutrition education should focus on promoting healthy eating behaviors and fostering a positive body image through counseling and regular nutritional status monitoring in School Health Services (UKS).

Key Messages:

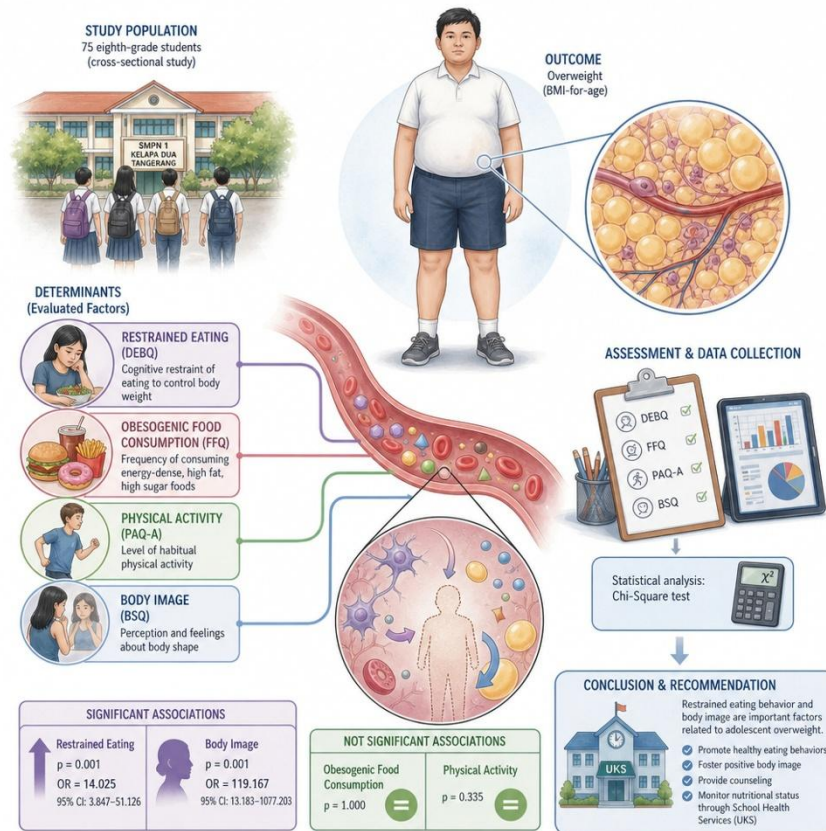
- Restrained eating and body image were significantly associated with overweight in adolescents at SMPN 1 Kelapa Dua Tangerang, highlighting the important role of psychosocial factors in adolescent overweight.
- Prevention should focus on promoting balanced eating habits and positive body image through school-based interventions.

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GRAPHICAL ABSTRACT



INTRODUCTION

Adolescence is a transitional period between childhood and adulthood. This period is characterized by rapid physical and mental growth and development (1). According to the Ministry of Health, adolescents, aged 10-18, are a critical period in the formation of long-term health behaviors. During this phase, an imbalance between nutrient intake and needs can directly impact nutritional status, one of which is overweight.

Overweight in adolescents has become a health problem with increasing prevalence. In Indonesia, findings from the 2018 Basic Health Research (Riskesdas) indicated that the rate of obesity among individuals over 18 years old rose significantly, from 15.4% in 2013 to 21.8% in 2018. Moreover, the Riskesdas statistics also revealed a rise in the incidence of central obesity within the population aged over 15 years, increasing from 26.6% in 2013 to 31% in 2018 (2). The 2018 Riskesdas data showed that the prevalence of adolescents aged 13-15 years in Tangerang City with a nutritional status of overweight was 7.88% and obesity was 8.13% (3). These data illustrate that the nutritional status of adolescents in Indonesia requires attention and improvement. This condition is a concern because overweight in adolescents not only impacts physical health, but also increases the risk of various chronic diseases.

Overweight in adolescents, often referred to as obesity, is a condition of nutritional imbalance that occurs due to nutrient and energy intake exceeding the body's needs over a relatively long period of time. This condition is characterized by weight gain caused by excessive body fat accumulation. Excess weight is categorized into overweight, which is a mild accumulation of excess fat, and obesity, which is a condition of very high fat accumulation so that body weight is far above the normal or ideal limit (4). In adolescents, overweight and obesity are serious problems because they can continue into adulthood (5).

Overweight in adolescents is influenced by various multifactorial factors, including increased consumption of obesogenic foods, minimal exercise, genetic predispositions, the effects of marketing, mental health issues, social and economic conditions, eating habits, age, and sex. These factors can cause energy imbalances that ultimately trigger overweight (6). One factor in adolescent eating behavior is restrained eating, which is the behavior of reducing food intake that can lead to excess weight. Adolescents

often exhibit this behavior because they are dissatisfied with their appearance (body image) (7). Adolescents who tend to have restrained eating behavior are usually more motivated to limit food intake, but their eating patterns become irregular, they often feel hungry, and ultimately have difficulty controlling their food consumption. Previous research has shown that restrained eating scores are higher in adolescents with overweight and obesity status and have a significant relationship with BMI (8,9).

Teenagers' eating patterns are often influenced by their surroundings, especially from fast food advertisements that are often found and usually include obesogenic foods (10). Obesogenic foods, such as fast food, junk food, and sweetened drinks. These types of foods are known to contain high amounts of energy, fat, and sugar, but low in fiber. An inappropriate and unbalanced diet can trigger obesity (11). Previous research stated that as many as 77.1% are obese due to excessive eating patterns of adolescents. This study shows that the majority of adolescents have an unbalanced diet where children often consume snacks, carbonated drinks, and sweet powdered drinks are the subjects' favorites, even the frequency of consumption can reach 4-7 times a day (5).

Another factor that plays a role in energy balance is physical activity. Physical activity helps burn energy in the body. Consuming too many calories without enough exercise can result in weight increase and obesity (12). Previous research showed that approximately 38.3% of individuals with a Body Mass Index (BMI) in the obese category had low physical activity levels, with an obesity prevalence of 40.9% (13). Other research also showed a relationship between physical activity and obesity (p -value = 0.007; OR = 3.08). Adolescents with low physical activity have a three-fold greater risk of obesity than those with high levels of physical activity (6).

Although the role of diet and physical activity has been extensively researched, psychosocial factors such as dietary restrictions and body image remain underexplored, particularly among adolescents in Indonesia. These factors are important because they can influence eating behavior, self-perception, and weight management practices, ultimately contributing to the onset or persistence of overweight. Previous research has tended to focus more on behavioral and environmental factors, with limited integration of psychological aspects. Therefore, it is important to simultaneously examine psychosocial and lifestyle factors to gain a more comprehensive understanding of overweight in adolescents.

Although numerous studies have been conducted on overweight in adolescents, what distinguishes this study from previous studies is the different research variables examined: restrained eating, obesogenic food consumption, physical activity, and body image in adolescents. The sampling location, SMPN 1 Kelapa Dua Tangerang, is still rarely studied in junior high school adolescents in the Tangerang area, as it is more commonly studied in high school and university settings. The Tangerang area environment, with its tendency towards westernization of diet and high availability of fast food around schools, has the potential to increase the risk of overweight in adolescents. Based on the results of preliminary research that has been conducted, there are 60% of students every 3-4 times a week consuming fast food and 80% often consume sweet drinks such as boba and packaged sweet tea. Students in this school are not allowed to buy snacks outside of school, so when entering the break time, the students will buy snacks in the school canteen, but due to the many snacks around this school based on preliminary studies there are 40% of students every 2 times a week, 30% every 3-4 weeks, and as many as 30% every day tend to consume snacks when going home from school. This consumption pattern is dominated by foods high in calories, fat, and cholesterol, especially with the increasing availability of fast food, which has an impact on increasing the risk of overweight. The purpose of this study is to determine the relationship between restrained eating, consumption of obesogenic foods, physical activity, and body image with the incidence of overweight in adolescents at SMPN 1 Kelapa Dua Tangerang. This study is expected to contribute to adolescents' understanding of the importance of healthy eating patterns, physical activity, body image in preventing overweight. It can be used as a reference to describe the risk factors for overweight and obesity in adolescents, so that steps can be taken to prevent and overcome the risk factors causing overweight in adolescents.

METHODS

This quantitative study used a cross-sectional approach. The aim was to analyze the relationship

between the independent variables: restrained eating, obesogenic food consumption, physical activity, and body image, with the dependent variable: overweight. The study was conducted from July to December 2025. The sample consisted of eighth-grade adolescents at SMPN 1 Kelapa Dua Tangerang. The sampling technique used was proportionate stratified random sampling, resulting in 75 respondents. Respondents were selected based on the inclusion criteria established by the researcher: eighth-grade students at SMPN 1 Kelapa Dua Tangerang, present at the time of the study, in good health and available for interview, and willing to participate.

The sample size for each class was determined proportionally to the number of students in each class, resulting in 7–8 respondents per class. Respondents were then selected using a simple random sampling method using class attendance lists generated using Microsoft Excel. Respondents were selected based on the randomization sequence. If a respondent did not meet the inclusion criteria or was unable to participate, they were replaced with the next respondent on the list until the sample size was reached.

Data on restrained eating were collected using the Dutch Eating Behavior Questionnaire (DEBQ), obesogenic food consumption was measured using the Food Frequency Questionnaire (FFQ) through interviews with respondents, physical activity was measured using the Physical Activity Questionnaire for Adolescents (PAQ-A), and body image was measured using the Body Shape Questionnaire (BSQ). All instruments used in this study have been widely used in adolescent populations. The DEBQ, FFQ, PAQ-A, and BSQ instruments have demonstrated good validity and reliability in previous studies, including in Indonesian populations. Reliability testing in this study was conducted using Cronbach's alpha, with values of 0.728 for the DEBQ, 0.622 for the PAQ-A, and 0.97 for the BSQ, indicating acceptable internal consistency.

In addition, anthropometric measurements were conducted to obtain weight and height data, using a microtoise for height and a BIA (Bioelectrical Impedance Analysis) scale for weight. Nutritional status was determined based on the BMI-for-age index (BMI/A) in the form of a z-score using the Permenkes RI 2020 reference for children and adolescents aged 5–18 years. The category of overweight is determined by the value $>+1$ SD. The collected data were examined through univariate analysis to outline the frequency distribution of every variable. Additionally, bivariate analysis utilizing the chi-square test was performed to assess the connection between restrained eating, obesogenic food consumption, physical activity, and body image with the incidence of overweight in adolescents at SMPN 1 Kelapa Dua Tangerang.

This study has obtained ethical approval from the Research Ethics Commission of Esa Unggul University and was conducted after respondents provided written informed consent.

RESULTS

The respondents in this study were 75 eighth-grade teenagers from different backgrounds. The ages of the respondents at SMPN 1 Kelapa Dua Tangerang ranged from 12–15 years old with both female and male genders. Based on Table 1, it can be seen that the respondents were dominated by males with a total of 38 respondents (50.7%), while the female gender was 37 respondents (49.3%). Then the age of the respondents in this study was mostly in the 12–13 age group (56.0%) with the age of 14–15 years (44.0%). The majority of respondents had pocket money per day $>$ Rp10,000–20,000 as many as 42 respondents (56.0%), Rp5,000–10,000 as many as 24 respondents (32.0%), and $>$ Rp20,000 as many as 9 respondents (12.0%). The parents' education level was dominated by high school education, both for fathers 59 respondents (78.7%), and mothers 60 respondents (80.0%). Based on the parents' occupation, especially the mothers, most of the mothers were unemployed 42 respondents (56.0%), while 33 mothers (44.0%) were employed.

Table 1. Frequency Distribution of Respondents Based on Characteristics at SMPN 1 Kelapa Dua Tangerang

Respondent Characteristics	n	%
Gender		
Male	38	50.7
Female	37	49.3

Respondent Characteristics	n	%
Age		
12-13 Years	42	56.0
14-15 Years	33	44.0
Nutritional status		
Underweight	9	12.0
Normal	47	62.7
Overweight	19	25.3
Pocket Money		
Rp 5.000-10.000	24	32.0
>Rp 10.000-20.000	42	56.0
>Rp 20.000	9	12.0
Father's Education		
Elementary school	3	4.0
Junior high school	2	2.6
Senior High School	59	78.7
College	11	14.7
Mother's Education		
Junior high school	10	13.3
Senior High School	60	80.0
College	5	6.7
Mother's Job		
Working	33	44.0
Not working	42	56.0
Total	75	100

The distribution of research variables is presented in Table 2. Of the 75 respondents, 19 (25.3%) were classified as overweight, while 56 (74.7%) were not. The majority of respondents had low restrained eating behavior (78.7%), while 21.3% had high restrained eating. A total of 42 respondents (56.0%) frequently consumed obesogenic foods, while 33 respondents (44.0%) rarely consumed obesogenic foods. The most frequently consumed foods were fast food (such as fried chicken, instant pasta), processed foods (such as nuggets, instant noodles, wafers/biscuits), high-fat foods (such as fried foods, packaged snack foods), sweet foods (such as chocolate, ice cream, donuts), and sweet drinks (powdered drinks, boba, sweet iced tea). The majority of respondents have a moderate level of physical activity. Of the total of 75 respondents, 46 respondents (61.3%) are included in the moderate physical activity category. Meanwhile, respondents with light physical activity numbered 24 respondents (32.0%) and heavy physical activity numbered 5 respondents (6.7%). The most common physical activities carried out by respondents came from daily activities and school, such as walking or cycling to school, attending physical education lessons, and light play activities with peers during free time. In addition, some adolescents also engage in unstructured physical activities such as playing outside the home or helping with household chores, but with a relatively low intensity. The majority of respondents have a positive perception of body image, namely 61 respondents (81.3%) and a small number of respondents have a negative body image, namely 14 respondents (18.7%).

Table 2 Frequency Distribution of Research Variables

Research Variables	n	%
Overweight		
Overweight	19	25.3
Not Overweight	56	74.7
Restrained Eating		
High Restrained Eating	16	21.3
Low Restrained Eating	59	78.7
Consumption of Obesogenic Foods		
Frequent	42	56.0
Infrequent	33	44.0

Research Variables	n	%
Physical Activity		
Light	24	32.0
Moderate	46	61.3
Vigorous	5	6.7
Body Image		
Negative body image	14	18.7
Positive body image	61	81.3
Total	75	100.0

A bivariate analysis of factors associated with overweight is presented in Table 3, it is known that respondents with high levels of restrained eating mostly experienced overweight, namely 11 respondents (68.8%), while those who did not experience overweight were 5 respondents (31.3%). Meanwhile, in respondents with low levels of restrained eating, most did not experience overweight, namely 51 respondents (86.4%), and only 8 respondents (13.6%) experienced overweight. The Chi-Square analysis showed a p-value of 0.001 ($p \leq 0.05$), indicating a significant association between restrained eating and the occurrence of overweight among adolescents at SMPN 1 Kelapa Dua Tangerang. Adolescents with high levels of restrained eating have a 14 times greater risk of experiencing overweight compared to adolescents with low levels of restrained eating (OR = 14.025; 95% CI=3.847–51.126).

In terms of obesogenic food consumption, 26.2% of respondents who frequently consumed obesogenic foods experienced being overweight, compared to 24.2% among those who rarely consumed them. Statistical analysis showed no significant association between obesogenic food consumption and overweight in adolescents at SMPN 1 Kelapa Dua Tangerang ($p=1.000$).

Respondents with light physical activity levels who experienced overweight were 8 people (33.3%), while 16 people (66.7%) did not experience overweight. In respondents with moderate physical activity, 9 people (19.6%) experienced overweight and 37 people (80.4%) did not experience overweight. Meanwhile, in respondents with heavy physical activity, there were 2 people (40.0%) who experienced overweight and 3 people (60.0%) who did not experience overweight. The results of statistical tests using the Chi-Square test obtained a p value = 0.335 ($p>0.05$) which means there is no significant relationship between physical activity and the incidence of overweight in adolescents at SMPN 1 Kelapa Dua Tangerang.

Respondents with a positive body image who experienced overweight were 6 people (9.8%), while 55 people (90.2%) did not experience overweight. Conversely, in respondents with a negative body image, 13 people (92.9%) experienced overweight and only 1 person (7.1%) did not experience overweight. Because there are cells with small frequencies, analysis using Fisher's Exact Test replaces the Chi-Square test. The results of statistical tests obtained a p value = 0.001 ($p \leq 0.05$) which means there is a significant relationship between body image and the incidence of overweight in adolescents at SMPN 1 Kelapa Dua Tangerang. Adolescents with a negative body image have a higher risk of experiencing overweight than adolescents with a positive body image (OR = 119.167; 95%CI=13.183–1077.203). However, wide confidence intervals indicate that the estimates have low precision.

Table 3 Bivariate Analysis of Factors Associated with Overweight in Adolescents at SMPN 1 Kelapa Dua Tangerang

Variables		Overweight				Total		P Value	OR	95% CI (lower-upper)
		Overweight		Not Overweight						
		n	%	n	%	n	%			
Restrained Eating										
High Eating	Restrained	11	68.8	5	31.3	16	100.0	0.001	14.025	3.847–51.126
Low Eating	Restrained	8	13.6	51	86.4	59	100.0			
Consumption of Obesogenic Foods										
Frequent		11	26.2	31	73.8	42	100.0	1.000		
Infrequent		8	24.2	25	75.8	33	100.0			

Variables		Overweight				Total		P Value	OR	95% CI (lower-upper)
		Overweight		Not Overweight						
		n	%	n	%					
Physical Activity										
Light		8	33.3	16	66.7	24	100.0	0.335		
Moderate		9	19.6	37	80.4	46	100.0			
Vigorous		2	40.0	3	60.0	5	100.0			
Body Image										
Negative body image	body	13	92.9	1	7.1	14	100.0	0.001	119.167	13.183–1077.203
Positive body image		6	9.8	55	90.2	61	100.0			
Total						75	100.0			

DISCUSSION

The findings of this study indicate that 74.7% of adolescents do not experience overweight. At this age, adolescents, especially junior high school age, most individuals are still in an active growth phase characterized by increased energy needs for growth and daily activities. If energy intake is relatively balanced with the body's needs and supported by sufficient physical activity, then nutritional status tends to be in the normal category. This is in line with research on adolescents at SMPN 13 Serang City which showed similar results, where 57 respondents (76%) had no overweight status while 18 respondents (24%) had overweight status (14). Overweight in adolescents is a condition that occurs due to an imbalance between energy intake and energy expenditure over a certain period of time. Adolescence is a period that is vulnerable to overweight due to changes in eating patterns, increased consumption of high-energy foods, and a tendency for low physical activity (15).

Based on the results of this study, it shows that the majority of respondents with low levels of restrained eating (78.7%). Restrained eating is a behavior that reduces food intake that can lead to excess weight. Adolescents often exhibit this behavior because they are dissatisfied with their appearance (body image) (7). Restrained eating reflects cognitive efforts to limit food consumption to control body weight, including strategies such as eating small portions, avoiding high-energy and fatty foods, and stopping eating before reaching satiety (16).

The findings of this study indicate that as many as 56.0% of adolescents consume obesogenic foods frequently. This result is slightly higher than that reported by Alifa *et al.*, 2020, where the number of respondents included in the category of frequently consuming obesogenic foods was 32 respondents (50%), while respondents who rarely consumed obesogenic foods also numbered 32 respondents (50%) (17). Obesogenic foods are types of food that have the potential to increase the risk of obesity, such as fast food, junk food, and sweetened drinks. These types of foods are known to contain high amounts of energy, fat, and sugar, but are low in fiber. An inappropriate and unbalanced diet can trigger the risk of overweight (11).

The study found that 61.3% of respondents performed moderate physical activity. Similar results were reported in previous studies, where 10 respondents (47.6%) with low activity levels were overweight (18). The most common physical activities carried out by respondents came from daily activities and school activities, such as walking or cycling to school, attending physical education lessons, and light play activities with peers during free time. In addition, some adolescents also carried out unstructured physical activities such as playing outside the house or helping with household chores, but with a relatively low intensity. This condition shows that respondents' physical activity was dominated by daily routine activities rather than planned or high-intensity exercise.

The findings of this study indicate that 81.3% of adolescents have a positive body image. These results are in line with research in Surakarta that showed 84.4% of respondents had a positive body image (19). The findings of a study also showed that most adolescents in the sample felt satisfied and accepted their body shape as it is (20). Positive perceptions of body image in adolescents indicate that most of them do not focus too much on their physical shortcomings, but are able to accept their physical appearance realistically. This is in accordance with the concept of body image which describes the subjective

assessment made by individuals of their body shape and size, and according to this concept, a positive body image reflects a stable attitude in accepting the body as a whole (21). Body image is an individual's description and assessment of their body shape. Body image can be categorized into two types, namely positive and negative body image. Positive body image describes an attitude of accepting and appreciating one's own body, while negative body image reflects an attitude of dissatisfaction with one's body shape (20). However, body image can change over time, especially in adolescents who are greatly influenced by interactions with peers, the school environment, and social assessments of physical appearance (22).

The results of the Chi-Square test in this study showed a relationship between restrained eating ($p = 0.001$; $p \leq 0.05$) and body image ($p = 0.001$; $p \leq 0.05$) with the incidence of overweight in adolescents at SMPN 1 Kelapa Dua Tangerang. Meanwhile, obesogenic food consumption and physical activity did not show a significant relationship with the incidence of overweight. This finding confirms that the incidence of overweight in adolescents is not only influenced by direct energy intake and expenditure factors, but also greatly influenced by interacting behavioral and psychosocial aspects.

The significant relationship between restrained eating and the incidence of overweight indicates that restrictive eating behavior can contribute to weight gain. Restrained eating or controlled eating behavior is a person's attempt to limit food intake, usually with the aim of losing weight or worrying about obesity. This appears to contradict restraint theory: if restrained eating involves limiting food intake, it is paradoxical that it may ultimately lead to excess weight. According to Snoek et al., restrained eating behaviors like meal skipping and irregular eating habits can trigger counterregulatory responses when self-control weakens, causing overeating and increasing the risk of weight gain (7). This finding is in line with previous research that showed a significant relationship between restrained eating behavior and nutritional status where the p -value = 0.003, $r = 0.173$ ($p \leq 0.05$). Restrained eating behavior shows a positive correlation, that the higher the level of restrained eating on food intake, the greater the tendency of the individual to have overweight status (23). This is consistent with other research showing a positive correlation between restrained eating and BMI in junior high school adolescents ($p=0.002$; $r=0.334$). In adolescent health, these results indicate that nutrition education needs to emphasize balanced and sustainable eating patterns, rather than extreme dietary restrictions that can potentially be counterproductive. However, due to the cross-sectional design of this study, a causal relationship cannot be established. It is possible that adolescents who are already overweight may adopt controlled eating behaviors in response to their weight, rather than the other way around. This suggests the possibility of reverse causality, where nutritional status may influence eating behavior.

The results of this study also indicate that obesogenic food consumption is not significantly associated with overweight. This finding appears to contradict theory and the majority of literature stating that consumption of foods high in energy, fat, and sugar contributes to weight gain (11). However, overweight is the long-term accumulation of energy intake, not just the frequency of consumption within a certain period. According to WHO 2023, increasing the number and size of food portions can increase total energy intake, which leads to overweight in children and adolescents. Furthermore, adolescents who frequently consumed obesogenic foods in this study did not all experience overweight because this behavior occurred simultaneously with restricted eating, indicating a discrepancy between the intention to restrict eating and actual consumption practices. Thus, despite the high frequency of obesogenic food consumption, total daily energy intake can still be controlled. This finding is in line with previous research that also found no association between obesogenic food consumption and overweight status with a p -value of 0.773 ($p > 0.05$) (17). In addition, consumption of obesogenic foods is also influenced by other factors such as perception of body image, level of nutrition knowledge, media influence, pocket money and parental education that influence adolescents' food choices (24). Furthermore, the FFQ relies on respondents' self-reports, making it susceptible to recall bias and likely not fully reflecting actual dietary intake. This limitation may have contributed to the lack of significant associations found in this study.

The lack of a relationship between physical activity and the incidence of overweight in adolescents in this study indicates that physical activity is not the sole determinant of nutritional status in adolescents. Physical activity plays a role in increasing energy expenditure in the body. When energy burned is equal to or exceeds energy intake from food, body weight tends to be maintained or decreased. However, if physical

activity is low, excess unused energy will be stored as fat, which can ultimately lead to overweight and obesity. The transition from an active lifestyle to a sedentary lifestyle also plays a role in the increasing incidence of overweight in adolescents (25). However, this study found a discrepancy between research results and theory, considering that physical activity plays a significant role in increasing energy expenditure and burning body fat, which ultimately can reduce the risk of overweight. In this study, although the physical activity undertaken was classified as light or moderate, adolescents still engaged in daily activities that contribute to energy expenditure, such as walking, school activities, and household chores. This condition allows energy balance to be maintained so that overweight does not occur. Furthermore, the nutritional status of adolescents in this study is more influenced by other factors, particularly eating behavior and psychology. This finding is in line with previous research at SMPN 13 Serang City which obtained a p-value of 0.243 ($p > 0.05$), thus indicating no significant relationship between physical activity and overweight status (14). This is in line with other research on adolescents at SMPN 36 Surabaya which obtained a p-value = 0.872 ($p > 0.05$), thus indicating no significant relationship between physical activity and the incidence of obesity (26).

Body image shows a significant relationship with the incidence of overweight in adolescents. In this study, it was found that adolescents with higher nutritional status tended to feel that their body shape was larger, compared to respondents with lower nutritional status. Therefore, it can be concluded that the more negative the body image in adolescents, the greater the tendency for their nutritional status to be in the overweight or obesity category. Adolescents with negative body image likely perceive this because they have experienced overweight. Theoretically, body image is a perception of the body. During adolescence, the formation of body image is greatly influenced by physical changes. If these changes do not match the body shape expected by adolescents, it can trigger the emergence of a negative body image. A negative body image can trigger a condition of dissatisfaction with body shape and size, known as body dissatisfaction (27). Body image is part of the psychosocial aspect that is greatly influenced by the environment, peer pressure, social expectations, and appearance standards internalized by adolescents. Adolescents with negative body image are often encouraged to engage in unhealthy or non-adaptive eating behaviors in an effort to change their body appearance, which ironically can increase the risk of excess fat accumulation and overweight (28). This finding is in line with previous research showing a significant relationship between body image and overweight status in adolescents ($p = 0.002$). The study reported that adolescents with nutritional status were more likely to experience dissatisfaction with their body shape compared to adolescents with poor nutritional status (29). This is in line with other research that found a significant relationship between body image and nutritional status in adolescents at SMAN 1 Denpasar with a p-value of $0.001 \leq 0.05$ (30). However, this relationship must be interpreted with caution. Adolescents who are already overweight are more likely to develop a negative body image as a result of their physical condition and social pressures, rather than a negative body image causing them to become overweight. Therefore, the relationship between body image and overweight status is bidirectional and influenced by reverse causality. Furthermore, the very large odds ratio with a wide confidence interval indicates that the estimate has low precision, which is likely due to the small sample size in certain categories. The results of this study confirm that body image is not only important in a psychological context but also has an impact on the nutritional status of adolescents, so that adolescent nutrition and health interventions need to include a psychosocial approach.

CONCLUSION

The findings of this study indicate that most respondents did not experience overweight (74.7%), had low restrained eating behavior (78.7%), frequent consumption of obesogenic foods (56.0%), moderate physical activity levels (61.3%) and had a positive body image (81.3%). The results of statistical tests showed a relationship between restrained eating ($p = 0.001$; $p \leq 0.05$) and body image ($p = 0.001$; $p \leq 0.05$) with the incidence of overweight in adolescents at SMPN 1 Kelapa Dua Tangerang. Meanwhile, obesogenic food consumption ($p = 1.000$; $p > 0.05$) and physical activity ($p = 0.335$; $p > 0.05$) did not show a significant relationship with the incidence of overweight in adolescents at SMPN 1 Kelapa Dua Tangerang. These findings suggest that overweight in adolescents is not only related to lifestyle factors but is also influenced

by psychosocial factors. However, due to the cross-sectional design of this study, a causal relationship cannot be established. Therefore, interventions should not only focus on improving dietary patterns and increasing physical activity, but also consider psychological factors, such as encouraging healthy eating behaviors and building a positive body image through school-based nutrition education and regular nutritional status monitoring through the UKS program.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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