

Original Research Article Outline:**AN ANALYSIS OF THE INFLUENCE OF PHYSICAL ACTIVITY, GADGET USE, AND DIETARY HABITS ON OBESITY AMONG CHILDREN AGED 9–12 YEARS**Nursyifa Putri Safina^{1)*}, Lilis Fatmawati²⁾, Khalifatus Zuhriyah Alfianti³⁾^{1,2)} Nursing Science Study Program, Faculty of Health Sciences, Universitas Gresik³⁾ Nursing Profession Study Program, Faculty of Health Sciences, Universitas Gresik

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ABSTRACT

Introduction. Obesity is a condition marked by excessive fat accumulation that threatens health. In Indonesia, obesity among children aged 9–12 years is becoming a significant public health concern. Contributing factors include lack of physical activity, excessive gadget use, and poor dietary habits. Obese children are at higher risk of chronic diseases such as type 2 diabetes, hypertension, and mental health issues. Lifestyle changes and limited awareness about balanced activities, screen time, and nutrition further exacerbate the problem. This study aims to examine the influence of physical activity, gadget use, and dietary patterns on obesity among school-aged children. **Method.** A quantitative, cross-sectional approach was used with a sample of 37 obese students aged 9–12 years, selected through total sampling. Data were collected using standardized instruments: PAQ-C for physical activity, SAS for gadget use, and a dietary pattern questionnaire. Data analysis employed multiple linear regression. **Result&Analysis.** The results showed that physical activity, gadget use, and dietary patterns each had a significant effect on obesity ($p < 0.05$). Low physical activity and high gadget use were associated with higher obesity levels, while healthy dietary patterns had a protective effect. Gadget use was the most dominant factor. **Discussion.** The study confirms that lifestyle factors significantly contribute to childhood obesity. Excessive gadget use, in particular, reduces physical activity and increases obesity risk. Preventive efforts involving parents, schools, and health professionals are crucial to fostering healthy habits in children.

Keywords: Obesity, Physical Activity, Dietary Pattern, Gadget Use, School-Age Children

INTRODUCTION

The problem of obesity among elementary school students in Indonesia is becoming increasingly alarming. Data from RISKESDAS 2018 shows that around 20% of school-aged children are overweight or obese—a condition that may persist into adulthood and increase the risk of chronic illnesses such as diabetes, hypertension, and psychological disorders. Obesity affects not only children's physical health but also their mental and social well-

being. The main contributing factors include unhealthy dietary patterns and low levels of physical activity, particularly the frequent consumption of high-fat and high-sugar snacks.

One exacerbating factor is excessive gadget use. Children often spend prolonged periods sitting or lying down while using gadgets, which significantly reduces physical activity. A preliminary study conducted at SDN Ketapang Barat 1 in January 2025 found that 10 students were experiencing various levels of

obesity, yet no intervention efforts had been implemented to address this issue. Globally, the WHO reported that more than 38 million children were overweight in 2020 due to unhealthy lifestyle habits.

The prevalence of childhood obesity in Indonesia continues to rise. According to RISKESDAS 2020, 21.1% of boys and 18.9% of girls aged 5–12 years were classified as overweight or obese. East Java is among the provinces with the highest prevalence, reaching 24.3%. In Sampang Regency, the rate of childhood obesity reached 16.07%. In 2024, SDN Ketapang Barat 1 recorded 38 students aged 9–12 years who were classified as obese.

The primary causes of childhood obesity include low physical activity, excessive use of gadgets, and poor eating habits. Children today are more inclined to play with gadgets than engage in physical activities. The consumption of fast food and junk food also significantly contributes to the risk of obesity. Although gadgets can be used positively, their usage must be supervised to prevent reduced physical activity and poor eating behaviors.

Efforts to prevent childhood obesity must be holistic, starting with encouraging children to be more physically active through sports and healthy play. Parents must also set boundaries and guide children toward responsible gadget use. In addition, nutritional education is essential to instill healthy eating habits and discourage the consumption of unhealthy foods. Based on these conditions, the researcher is interested in analyzing the influence of physical activity, gadget use, and dietary habits on obesity among children aged 9–12 years.

METHOD AND ANALYSIS

This study used a quantitative method with a cross-sectional design. The aim was to analyze the relationship between physical activity, gadget use, and dietary patterns with obesity in children

aged 9–12 years. The research was conducted at SDN Ketapang Barat 1 in 2024. The total population consisted of 37 obese students aged 9–12 years, and total sampling was used, meaning all students who met the inclusion criteria were included as respondents.

The research instrument used questionnaires covering three aspects: physical activity (using PAQ-C), gadget use (Smartphone Addiction Scale/SAS), and dietary habits. All questionnaires were filled out by the respondents with researcher assistance to ensure accuracy and completeness of the data.

The independent variables in this study were physical activity, gadget use, and dietary patterns, while the dependent variable was childhood obesity. Each variable was operationally defined and measured based on standardized indicators relevant to children's lifestyle and health status.

Data were analyzed using multiple linear regression to determine the simultaneous and partial influence of each independent variable on obesity. Prior to regression analysis, the data underwent classical assumption testing to ensure the validity of the model.

This analytical approach allowed the researcher to identify which lifestyle factors most significantly contributed to obesity among school-aged children and provided a basis for designing targeted health interventions involving parents, schools, and health authorities.

RESULT

Based on Table 1, the majority of respondents were in the 11–12 years age group, accounting for 56.76%. In terms of gender, most of the children were male (56.76%), while the rest were female (43.24%). Regarding body weight, 43.24% of children had a weight between 45–55 kg, and 37.84% were in the >55–65 kg range. As shown in Table 1, the highest

proportion of height was in the 130–145 cm group (48.65%), followed by 120–130 cm (43.24%). In terms of BMI, most respondents (78.38%) were in the 30–35 category. When categorized by obesity level, the majority (67.57%) were classified as Obesity Level 1.

Table 1 Frequency Distribution of Respondent Characteristics

Variable	Category	f	%
Age	9–10	16	43.24%
	11–12	21	56.76%
Gender	Male	21	56.76%
	Female	16	43.24%
Body Weight (kg)	45–55	16	43.24%
	>55–65	14	37.84%
	>65–76	7	18.92%
Height (cm)	120–130	16	43.24%
	>130–145	18	48.65%
	>145–156	3	8.11%
BMI	30–35	29	78.38%
	>35–40	7	18.92%
	>40	1	2.70%
Obesity Level	Level 1	25	67.57%
	Level 2	9	24.32%
	Level 3	3	8.11%
Total		37	100%

As shown in Table 2, most respondents (72.97%) had a moderate level of physical activity, while 27.03% had high activity. None reported low physical activity. Regarding gadget use, 54.05% were in the moderate category, and 45.95% were in the high-use group. Meanwhile, 70.27% of respondents were categorized as having poor dietary habits, and only 29.73% had good eating habits.

Table 2 Frequency Distribution of Lifestyle Factors

Variable	Category	f	%
Physical Activity	Moderate	27	72.97%
	High	10	27.03%
Gadget Use	Moderate	20	54.05%
	High	17	45.95%
Eating Patterns	Poor	26	70.27%
	Good	11	29.73%
Total		37	100%

Based on Table 3, the regression analysis between physical activity and obesity showed a significant result ($p = 0.000$) with a positive B coefficient (+24.945), indicating a statistically significant positive relationship between physical activity level and obesity. However, this may reflect higher activity levels in children with greater body mass.

Table 3 Regression Result: Physical Activity and Obesity

Variable	Sig.	B Coefficient
Physical Activity	0.000	+24.945

According to Table 4, gadget use showed a non-significant relationship with obesity ($p = 0.482$), and the B coefficient was -0.356 . This suggests a negative but not statistically significant association between gadget use and obesity, meaning the use of gadgets cannot be conclusively linked to weight outcomes in this study.

Table 4 Regression Result: Gadget Use and Obesity

Variable	Sig.	B Coefficient
Gadget Use	0.482	-0.356

As shown in Table 5, dietary patterns had a significant negative relationship with obesity ($p = 0.007$, $B = -24.008$). This means that better dietary habits are associated with lower levels of

obesity, and this relationship is statistically significant.

Table 5 Regression Result: Dietary Patterns and Obesity

Variable	Sig.	B Coefficient
Eating Patterns	0.007	-24.008

DISCUSSION

The findings of this study indicated that physical activity had a significant and positive relationship with obesity among children aged 9–12 years at SDN Ketapang Barat 1. The regression analysis showed a p-value of 0.000 with a positive coefficient, suggesting that children who reported higher levels of physical activity also exhibited higher levels of obesity. This appears contrary to the general understanding that physical activity helps reduce body weight. However, the result can be interpreted in the context of compensatory eating behaviors or reverse causality, where obese children may be encouraged to be more physically active as a response to their weight status. This is in line with WHO (2020) and the Indonesian Ministry of Health (2022), which stress that physical activity alone is not sufficient to combat obesity without a balanced diet. Thus, increased activity without appropriate dietary regulation may not result in weight reduction.

In contrast, the variable of gadget use showed a negative but statistically insignificant association with childhood obesity ($B = -0.356$, $p = 0.482$). Although the data suggested that higher gadget use might correlate with lower obesity, this relationship was not significant and may have been influenced by confounding factors such as physical activity levels or dietary patterns. Prior research by Maesarah et al. (2020) and guidelines from the American Academy of Pediatrics highlight that excessive screen time contributes to sedentary behavior and

unhealthy snacking habits. Despite the non-significance in this study, screen time remains a potential indirect risk factor for obesity and should be managed carefully in home and school settings.

The dietary pattern variable showed a significant negative relationship with obesity ($B = -24.008$, $p = 0.007$), indicating that better eating habits were associated with lower levels of obesity. This confirms that diet quality plays a crucial role in managing children’s weight. According to Qurrotul et al. (2023), poor eating habits—such as high intake of processed foods and sugary snacks—significantly increase the risk of childhood obesity. Family food environment, availability of nutritious options, and school meal choices are contributing factors. Therefore, nutrition education and habit formation at an early age are essential to prevent excessive weight gain.

The overall regression analysis indicated that physical activity, gadget use, and diet collectively had a significant influence on childhood obesity ($p = 0.000$). While diet and physical activity had significant individual effects, gadget use did not. Interestingly, the direction of the association for physical activity remained positive, which may reflect a reverse pattern of cause and effect—where children who are already obese are more encouraged to be active. Low-intensity and unstructured physical activities may also fail to yield effective results in weight management, as noted by Yugan et al. (2023). It highlights the importance of not just increasing activity but ensuring it meets the recommended intensity and duration, such as 60 minutes of moderate-to-vigorous activity daily as advised by WHO.

Among the three variables studied, physical activity emerged as the most dominant factor influencing obesity, supported by the highest regression coefficient (+24.945) and lowest p-value (0.000). However, this result must be interpreted cautiously, as it may reflect

increased activity as a response to obesity rather than its cause. In practice, effective intervention programs must address not only physical activity but also promote balanced nutrition and reduce screen time. A holistic strategy involving parents, teachers, and healthcare providers is needed to ensure sustainable lifestyle changes for children at risk of obesity.

CONCLUSION

There is a significant relationship between physical activity and obesity among children aged 9–12 years. The analysis showed a positive and significant association, indicating that higher levels of physical activity were followed by higher levels of obesity. This may be due to excessive calorie compensation after physical activity, poor dietary habits, or low-intensity activities that are insufficient to burn calories. In addition, obese children are often encouraged by parents or teachers to be more active, resulting in a misleading perception that they are more physically engaged than children with normal weight.

There is a negative but statistically insignificant relationship between gadget use and obesity. Although the regression coefficient suggests that higher gadget use may be linked to lower obesity, this finding was not statistically significant. Despite this, excessive gadget use remains a potential risk factor for sedentary behavior and unhealthy snacking, which could lead to obesity over time.

There is a significant and negative relationship between dietary patterns and obesity. Children who have healthier eating habits—balanced intake of fiber, vegetables, and reduced consumption of sugary and fatty foods—tend to have lower levels of obesity. Therefore, a healthy diet plays a critical protective role in preventing obesity among school-aged children.

Together, physical activity, gadget use, and dietary patterns have a significant simultaneous effect on obesity. This

confirms that obesity is a multifactorial condition influenced by various lifestyle behaviors. Preventing obesity in children requires a comprehensive strategy that includes healthy eating, adequate and effective physical activity, and controlled screen time.

Among the three factors examined, physical activity emerged as the most dominant variable influencing obesity in children aged 9–12 years. This was supported by the highest regression coefficient and strongest level of significance ($p = 0.000$). However, this dominance should be interpreted with caution, as increased activity may be a response to existing obesity and not necessarily an effective cause of weight reduction unless combined with a healthy diet and reduced screen time.

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