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THE IMPACT OF PHYSICAL ACTIVITY ON OBESITY PREVENTION IN CHILDREN AGED 13-15 YEARS BASED ON NARRATIVE LITERATURE REVIEW

Haeril[1abcde)]
[1]Departement of Sports Science study Program, Faculty of Sports and Health Sciences, Universitas Negeri Makassar, Indonesia

ABSTRACT
Obesity is an increasing public health problem, including in children aged 13-15 years. The increasing prevalence of obesity is influenced by lifestyle changes, fast food consumption, and low physical activity due to the use of gadgets or smartphones and sedentary lifestyles. Childhood obesity can continue into adulthood and increase the risk of degenerative diseases in later life. The purpose of this study is specifically to determine the impact of physical activity on preventing obesity in children, while specifically aiming to provide an overview of the factors that cause obesity in children. The method used in this study uses the NLR (Narrative Literature Review) approach. Literature searches were conducted through several databases such as PubMed, Google Scholar, and ScienceDirect. The number of articles used as secondary data was 10 scientific articles in both national and international reputable scientific journals with a time limit of publishing articles in the last 10 years to keep looking for novelty. Keyword limitations used in the search include physical activity, obesity prevention, children aged 13-15 years, and adolescents. Based on the results of the study, it was found that physical activity has an impact on preventing childhood obesity and there are several factors that can reduce physical activity in children, namely individuals, families, the environment, facilities and infrastructure, and the influence of technology. Increasing physical activity should be a priority in childhood obesity prevention strategies. The conclusion of this study is that efforts to prevent childhood obesity need to involve a multidimensional approach. Not only maintaining the child's diet but including physical activity in the school environment, family, and community. Physical activity plays an important role in preventing obesity in children aged 13-15 years.
Keyword*:* physical activity; obesity; children; 13-15 years of age

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Corresponding Author: Haeril, Departement of Sports Science study Program, Faculty of Sports and Health Sciences, Universitas Negeri Makassar, Indonesia
haeril@unm.ac.id

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INTRODUCTION

Obesity is one of the biggest public health challenges in the modern world. Obesity is a condition that occurs where the quantity of body fat tissue to total body weight is greater than the normal state (Sumarni & Bangkele, 2023). According to the World Health Organization (WHO) report, the prevalence of obesity in children and children has increased drastically in the last four decades (Organization, 2023). In Indonesia alone, it shows that the incidence of obesity in children

aged 13-15 years is experiencing an upward trend, along with changes in lifestyle and consumption of fast food that is high in calories (Kemenkes, 2023). This condition is a cause for concern, considering that childhood obesity can continue into adulthood and increase the risk of degenerative diseases in the future.

Childhood, especially age 13-15 years, is an important developmental phase characterized by biological, psychological and social changes (Helmaliah et al., 2024). During this period, there is an increased need for energy to support growth, but also increased independence in choosing food and daily activities. Unfortunately, modern lifestyle changes, such as excessive use of gadgets or smartphones and increased sedentary activities, have significantly reduced children's physical activity levels (Haeril & Asri, 2020). This is a major factor contributing to the high rates of obesity in this age group (Jebeile et al., 2022).

Physical activity plays an important role in maintaining energy balance and preventing the accumulation of body fat (Brooks et al., 2004). WHO recommends that children engage in moderate to high-intensity physical activity for at least 60 minutes every day (WHO, 2018). Such activity not only helps in burning calories, but also increases basal metabolism, improves body composition, and enhances cardiovascular health. Thus, physical activity is an effective primary prevention strategy for obesity, especially when started at a young age.

The results show that adequate levels of physical activity correlate with a healthier body mass index (BMI). Longitudinal studies prove that physically active children are less likely to be obese compared to less active children (McManus & Mellecker, 2012). Moreover, physical activity also has the added benefits of improving mental health, improving sleep quality and strengthening social skills, all of which contribute to a sustainable healthy lifestyle (Martín-Rodríguez et al., 2024).

Some barriers that can reduce children to be active in physical activity, such as lack of sports facilities, academic pressure, peer influence, and low support from family (Duffey et al., 2021). In addition, higher exposure to digital technology leads to an increase in prolonged sitting behavior (Pebriani & Darmiyanti, 2024). Therefore, it is important to understand these factors in depth so that interventions designed can be more targeted in increasing physical activity levels in children.

This research presents scientific originality by employing a narrative literature review method that concentrates on the early adolescent age range (13–15 years)—a demographic undergoing a significant transitional phase in physical, psychological, and social growth, yet has seldom been examined in a targeted way in existing literature. Many earlier studies have merged children and adolescents into a single large category (ages 6–18 years), thereby masking the specific dynamics of early puberty that are closely linked to shifts in physical activity habits and obesity risk.

Furthermore, this research offers a thematic synthesis of recent investigations (2015–2024) that examine the link between physical activity and obesity from multiple perspectives—physiological, psychosocial, environmental, and digital behavior. This enables a more comprehensive grasp of the elements that enhance or hinder the impact of physical activity on preventing obesity in young people.

Another innovation involves recognizing and charting particular inhibiting factors pertinent to contemporary adolescent growth, such as overuse of devices, academic stress, insufficient green spaces, and social media's impact on body image and the motivation for physical activity. This research further aids in creating evidence-supported policy suggestions for health promotion initiatives in educational institutions and communities, highlighting the need for a collaborative approach among education, families, and healthcare resources to boost physical activity among adolescents and prevent obesity early on.

Based on this background, this study aims to review narratively the scientific evidence on the impact of physical activity in preventing obesity in children aged 13-15 years. By understanding the role of physical activity more comprehensively, it is hoped that the results of this study can form the basis for the development of effective health promotion programs and intervention policies at the school, family and community levels.

METHODS

This research used the NLR (Narrative Literature Review) approach. Literature searches were conducted through several databases such as PubMed, Google Scholar, and ScienceDirect. The number of articles used as secondary data was 10 articles in both national and international journals with a time limit of publishing articles in the last 10 years to keep looking for novelty. The author limited the keywords used in the search to include physical activity, obesity prevention, children aged 13-15 years, and adolescents. The inclusion criteria of the articles analyzed can be seen in table 1.

Table 1. Research Inclusion Criteria

Type	Inclusion Criteria
Article Type	Research Article
Year of Publication	2015-2025
Article Origin	National and International
Article Standard	Nationally and Internatinal reputable
Sample	Aged13-15
Research Methods	Experiment

The first step in this study was to identify the topic and purpose of the study, which was to map the relationship between physical activity and obesity in children. The collected literature was then selected based on relevance and methodological quality, and analyzed narratively to find patterns, similarities, and differences in findings from various sources. From the search results, 10 relevant articles were analyzed and synthesized to describe the relationship between physical activity and obesity prevention. Data identification and extraction using the PRISMA flow chart. At the data extraction stage, researchers searched for articles according to keywords to get a total of 70 scientific articles obtained through google scholar, sciencedirect, and pubmed. A total of 32 articles met the criteria for reputable publications. At the eligibility stage, 21 articles were excluded because there were several exclusion criteria and 7 articles did not meet due to a review of the suitability of the abstract, research methods and interventions.

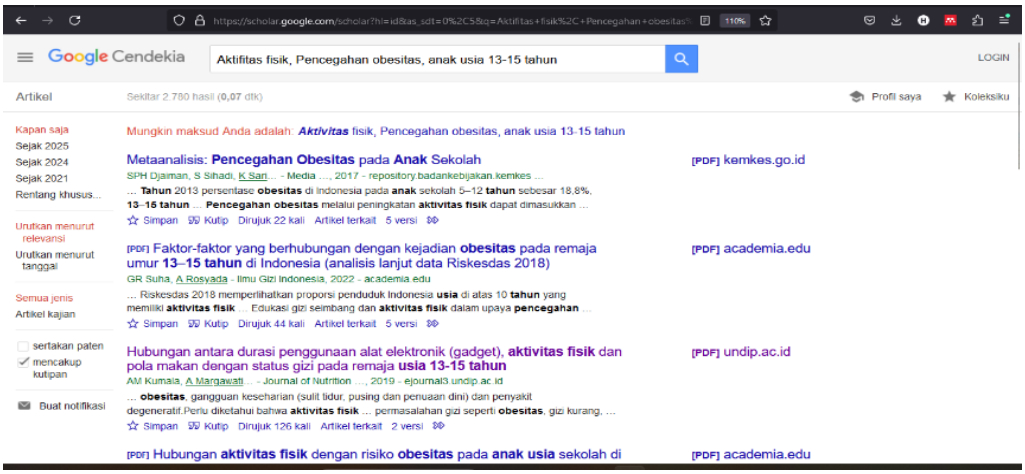

Figure 1. Article search on Google scholar

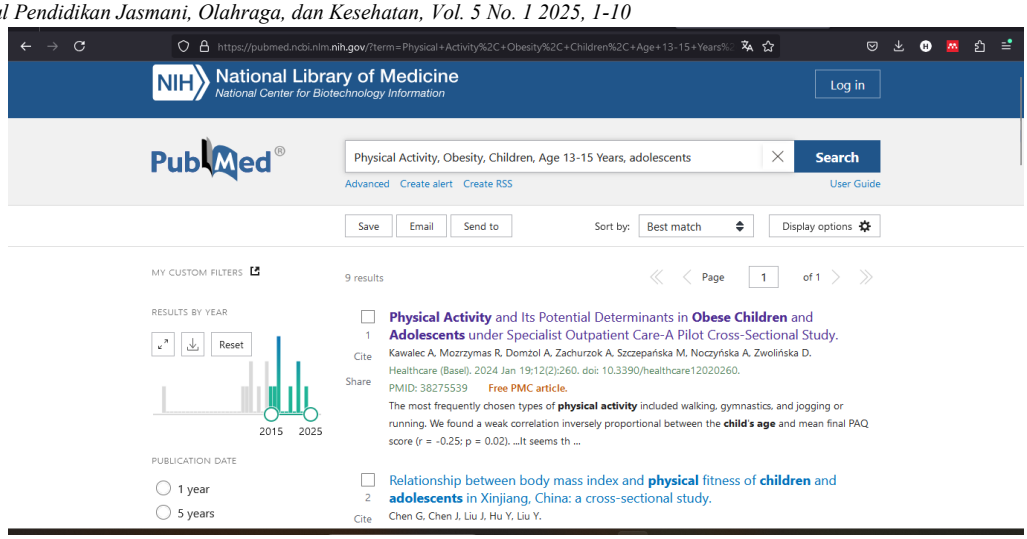

Figure 2. Article search on PudMed

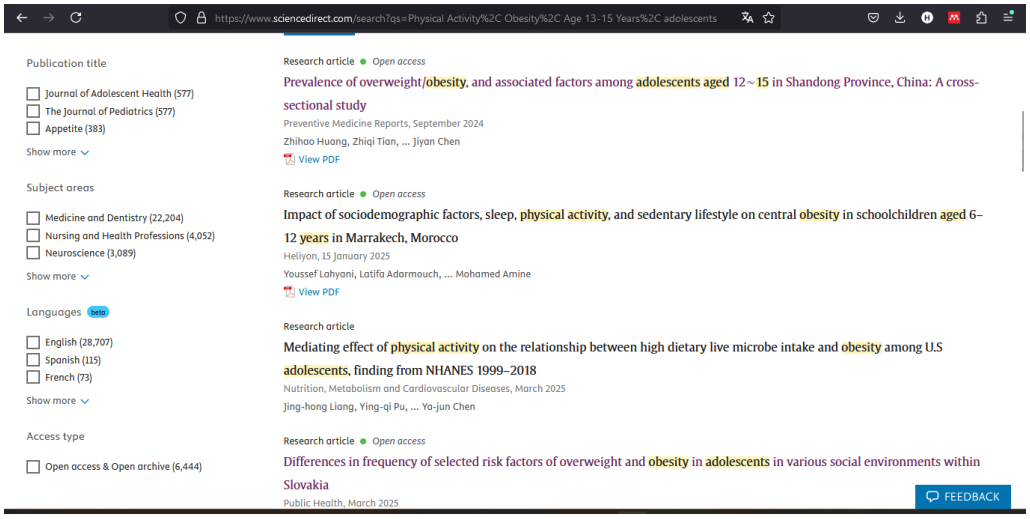

Figure 3. Article search on Sciencedirect

FINDINGS

Physical activity and obesity have a very close and reciprocal relationship. In general, physical activity serves as one of the main protective factors against excessive weight gain and body fat accumulation. Conversely, lack of physical activity, often referred to as sedentary behavior, contributes significantly to the increased risk of obesity, both in children, children, and adults. The following are the results of the analysis in table 2.

Table 2. Analysis Results

No	Authors and Methods	Research Title	Research Results
1	(Suha & Rosyada, 2022), Eksperimen	Factors Associated with the Incidence of Obesity in Children 13-15 Years of Age in Indonesia (Advanced Analysis of RISKESDAS 2018 Data)	Age, gender, physical activity, and fat consumption are strongly associated with the incidence of obesity among 13-15 year olds in Indonesia.
2	(Kumala et al., 2019) , Eksperimen	The Relationship Between Duration of Gadget Use, Physical Activity and Diet with Nutrition Status in 13-15 Year Old Children	There is a relationship between duration of gadget use, physical activity and diet with nutritional status in children aged 13-15 years.

3	(Leonardo et al., 2021) , Eksperimen	Overview of Nutritional Status and Physical Activity of Children during the COVID-19 Pandemic	Children with very light and light physical activity tend to have overweight and obese nutritional status. Meanwhile, children with heavy and very heavy physical activity have normal nutritional status.
4	(Bahar et al., 2023) , Eksperimen	Physical Literacy of 13-15 Year Old Children in South Sulawesi	Children aged 13-15 years in Makassar city have good physical literacy knowledge on 20 test instruments. This is related to the holistic development of children aged 13-15 years, namely if a person's body is healthy then they will grow and develop optimally.
5	(Afandi & Avandi, n.d.) , Eksperimen	Macronutrient Consumption Patterns and Physical Activity of 13-15 Year Old Children	Children who consume nutrients and macronutrients associated with low physical activity patterns
6	(García-Hermoso et al., 2019) , Eksperimen	Health-Related Physical Fitness And Weight Status in 13 to 15 Year Old Latino Adolescents	Children who are overweight or obese show lower fitness levels compared to their normal weight peers.
7	(Kawalec et al., 2024) , Eksperimen	Physical Activity and Its Potential Determinants in Obese Children and Adolescents under Specialist Outpatient Care-A Pilot Cross-Sectional Study	Children's physical activity patterns depend on their surroundings or where they live, which will also affect obesity rates.
8	(Yang et al., 2023) , Eksperimen	Associations of Multiple Sleep Dimensions With Overall and Abdominal Obesity Among Children and Adolescents: A Population-Based Cross-Sectional Study	Short or too long sleep duration, late bedtime, and social inequality in children are closely related to the prevalence of obesity.
9	(Malobická et al., 2025) , Eksperimen	Differences in Frequency of Selected Risk Factors of Overweight and Obesity in Adolescents in Various Social Environments Within Slovakia	Regional social environments are associated with certain aspects of child behavior related to overweight and obesity, namely poverty areas and neighborhoods.
10	(Huang et al., 2024) , Eksperimen	Prevalence of Overweight/Obesity, and Associated Factors Among Adolescents Aged 12-15 in Shandong Province, China: A Cross-Sectional Study	Childhood overweight/obesity requires a comprehensive understanding of its various determinants. Addressing these factors holistically can guide targeted interventions to promote a healthier lifestyle.

Age, gender, physical activity, and fat consumption are strongly associated with the incidence of obesity in children aged 13-15 years (Suha & Rosyada, 2022). Several longitudinal studies have shown that physically active children have a lower risk of obesity compared to their less active peers. Physical activity of at least 60 minutes per day of moderate to vigorous intensity is associated with lower Body Mass Index (BMI) and healthier body fat percentage (Hill et al., 2012). In contrast, sedentary behaviors such as watching television, playing video games, or long-duration social media use have been associated with an increased risk of overweight and obesity (Haeril & Asri, 2020).

DISCUSSION

Obesity in children aged 13–15 years is a consequence of the complex interaction between modern lifestyles, behavioral changes, and environmental and social factors. One of the most significant factors that emerged from various studies is the lack of physical activity, which is exacerbated by increased use of gadgets, unhealthy eating patterns, and limited supporting facilities for active movement. This study systematically maps that physical activity has a strong protective effect on obesity, and is consistently found in ten national and international scientific articles reviewed. This finding is in line with the basic concept of energy balance in the theory of (Hill et al., 2012), which states that increasing energy expenditure through physical activity is very important to prevent the accumulation of body fat. Sufficient physical activity, as recommended by (WHO, 2018), at least 60 minutes per day, has been shown to be effective in reducing body mass index (BMI) and improving children's cardiovascular fitness.

In a social context, the results of the study strengthen Bronfenbrenner's ecological model which shows that children's health behavior is greatly influenced by the microenvironment (family and school), meso (interaction between environments), and macro (culture and policy). For example, the study by (Kawalec et al., 2024) revealed that the residential environment has a major influence on the physical activity patterns of obese children. Research by (Malobická et al., 2025) also supports this, highlighting that children in poor social environments tend to have higher sedentary behavior. The important thing that emerged from this synthesis is the role of physical literacy and family support. (Bahar et al., 2023) emphasized that good physical literacy is correlated with an active lifestyle, while (Trindade et al., 2025) showed that active families are role models in shaping children's physical habits. A new aspect of this study is the understanding that collective interventions—involving schools, families, and communities—are more effective than individual approaches.

In addition, the role of digital media as a barrier to physical activity was also confirmed in the studies of (Kumala et al., 2019) and (Haeril & Asri, 2020), showing that excessive gadget use not only reduces physical activity but also has a negative impact on eating patterns and sleep time. This is consistent with the findings of (Yang et al., 2023) that poor sleep quality is closely related to obesity, strengthening the understanding that obesity prevention is multidimensional.

However, this study has limitations because it relies on secondary data from studies with heterogeneous experimental designs. Other limitations are the variation in methods of measuring physical activity and obesity, as well as the uneven socio-cultural contexts analyzed. This suggests the need for further research with locally based longitudinal or quasi-experimental designs. Practically, these findings imply that childhood obesity prevention programs should focus more on providing environments that support physical activity: green open spaces, sports facilities at school, screen time regulations at home, and integration of physical activity into the curriculum. Community-based interventions are also a promising option for creating sustainable behavior change.

Obesity occurs not only with a lack of physical activity, but several factors influence the occurrence of obesity, namely the environment, diet, behavior and genetic factors (Yadav & Jawahar, 2022). Physically active children tend to have healthier diets, such as higher consumption of fruits and vegetables, compared to less active children. Physical activity can also help reduce the negative effects of genetic predisposition to obesity (Leonardo et al., 2021). Physically active children are a key strategy in obesity prevention efforts. Intervention programs that encourage regular physical activity, reduction of sedentary behavior, and promotion of active lifestyles should be an integral part of public health policies to reduce the prevalence of obesity in the pediatric population (Schoeppe et al., 2016).

Adequate and regular physical activity is essential to prevent childhood obesity. Various factors can inhibit children from doing physical activity, thus increasing the risk of overweight and obesity (Unicef, 2020). These inhibiting factors can be categorized as individual, family, social environment, facilities and infrastructure, and technology. On individual factors, children who lack motivation tend to prefer sedentary activities, such as watching television or playing games, rather than participating in physical activity (Alcántara-Porcuna et al., 2021). Lack of understanding about the importance of exercise for health also exacerbates this condition. Children who are overweight often have a sense of shame about their body shape, making them reluctant to participate in physical activities in front of their peers (Pont et al., 2017).

One of the factors so that children no longer do physical activity is the use of smartphones. Children are more active playing smartphones with the category of playing online games compared to physical activity (Haeril & Asri, 2020). Based on the evidence found, physical activity has a central role in the prevention of childhood obesity. Structured, consistent and community-based interventions show more sustainable results. Public policy support that encourages the provision of sports facilities and the promotion of active lifestyles is also an important factor (Wyszyńska et al., 2020).

Childhood obesity caused by physical inactivity can lead to a variety of other health complications, including insulin resistance, hypertension, dyslipidemia, and increased risk of metabolic syndrome (Swarup et al., 2024). Obese children are also at higher risk of becoming obese individuals in adulthood, with various long-term health consequences. Environmental factors also influence children's physical activity levels (Li et al., 2025). Supportive environments, such as the availability of playgrounds, safe pathways for walking or cycling, and sports programs in schools, can increase children's engagement in physical activity (Malobická et al., 2025).

Family and social factors also contribute greatly to children's physical activity levels (Trindade et al., 2025). Children who grow up in physically active families tend to have similar habits. Emotional support, modeling, and family participation in shared sports activities play an important role in shaping active lifestyles in children. In obesity prevention efforts, it is important to promote fun and age-appropriate physical activities, such as outdoor games, team sports, or creative activities that involve movement (Vasundhara & Nagaraju, 2024). Intervention programs that involve families, schools, and communities will be more effective in creating long-term behavior change. Therefore, physical activity should be prioritized in childhood obesity prevention strategies. This will not only reduce the prevalence of obesity, but also improve children's overall physical, mental and social health.

CONCLUSION

Physical activity plays an important role in the prevention of obesity in children aged 13-15 years. The duration, intensity and consistency of physical activity have a significant impact on body weight regulation and body composition. Efforts to prevent childhood obesity need to involve a multidimensional approach, including the promotion of physical activity in school, family and community settings. Further research is needed on the most effective interventions in various social and cultural contexts. For future research, a more focused intervention study is recommended to identify the most effective strategies in increasing children's physical activity. For example, the implementation of school-based sports programs, the timing of smartphone use in the family environment, or the provision of green open spaces that support physical activity in the residential environment. Experimental or quasi-experimental research may be an appropriate approach to empirically assess the effectiveness of these interventions.

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CONFLICT OF INTEREST

The authors declare that they have no competition.

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