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+15878858911
editorial-office@sciformat.ca

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THE ROLE OF PHYSICAL ACTIVITY AND LIMITING SCREEN TIME IN PREVENTING OBESITY IN CHILDREN – A LITERATURE REVIEW

Maciej Jakubiec (Corresponding Author, Email: jakubiec.maciej@gmail.com)

Beskidzkie Centrum Onkologii – Municipal Hospital of John Paul II in Bielsko-Biala, Bielsko-Biala, Silesia, Poland

ORCID ID: 0009-0009-3408-3354

Emilia Gąsiorowska

Stefan Cardinal Wyszyński Provincial Specialist Hospital SPZOZ in Lublin, Lublin, Poland

ORCID ID: 0009-0007-0371-995X

Anna Wawrzeczko

Beskidzkie Centrum Onkologii – Municipal Hospital of John Paul II in Bielsko-Biala, Bielsko-Biala, Silesia, Poland

ORCID ID: 0009-0000-0329-150X

Natalia Górską

American Heart of Poland, Ustroń, Silesia, Poland

ORCID ID: 0009-0009-7511-222X

Angelika Jankowska

Independent Public Voivodeship Integrated Hospital in Szczecin, Szczecin, Poland

ORCID ID: 0009-0003-3002-7028

Magdalena Gostół

District Health Center in Otwock, Otwock, Poland

ORCID ID: 0009-0004-3987-3818

Katarzyna Wójtowicz

Dolnośląskie Centrum Onkologii, Pulmonologii i Hematologii, Wrocław, Poland

ORCID ID: 0009-0002-3349-8610

Gabriela Deska

Dolnośląskie Centrum Onkologii, Pulmonologii i Hematologii, Wrocław, Poland

ORCID ID: 0009-0001-3076-7814

Martyna Susek

Beskidzkie Centrum Onkologii – Municipal Hospital of John Paul II in Bielsko-Biala, Bielsko-Biala, Silesia, Poland

ORCID ID: 0009-0006-7383-8121

Amadeusz Furmanek

Provincial Hospital in Bielsko-Biala, Bielsko-Biala, Silesia, Poland

ORCID ID: 0009-0003-6839-2207

ABSTRACT

Obesity in childhood and adolescence is a serious public health challenge, and its growing prevalence in the population correlates with lifestyle changes, including increased screen time and reduced physical activity. This narrative review synthesizes the results of studies and reports published between 2000 and 2025 that analyze the relationship between physical activity, screen time, and overweight and obesity in children and adolescents. Meta-analyses show that children who use screen devices for more than 2 hours a day have a significantly higher risk of being overweight or obese (Haghjoo et al., 2022). At the same time, regular physical activity counteracts positive energy balance and promotes the maintenance of a healthy body weight. The review also highlights indirect mechanisms—not only reduced energy expenditure, but also a tendency to snack, unhealthy eating habits, and poorer sleep quality, which overall promote the development of obesity. The results suggest that prevention should take a multidimensional approach, including limiting screen time, encouraging daily physical activity, health and nutritional education at school and in the family environment. Such comprehensive measures, taken from early childhood, can contribute to reducing the prevalence of overweight and obesity and limit their long-term health effects among the pediatric population.

KEYWORDS

Childhood Obesity, Physical Activity, Screen Time, Overweight, Prevention

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1. Introduction

In recent decades, childhood obesity has become one of the most important public health issues worldwide. In 2024, the global prevalence of overweight and obesity among children and adolescents was 8.5 % and 14.8%, respectively, meaning that one in four children or adolescents was overweight (Zhang et al., 2024). This is due to many factors, including environmental changes, diet, and lifestyle, in which the use of screen devices and a sedentary lifestyle play an increasingly significant role.

These days children spend more and more of their free time using smartphones, tablets, computers, and television, which is often associated with reduced physical activity, insufficient amount of sleep, and changes in eating habits. Available publications indicate a link between long screen time (more than 2 hours per day) and an increased risk of overweight and obesity in children and adolescents (Fang et al., 2019). At the same time, many studies indicate that low or moderate physical activity and a sedentary lifestyle significantly contribute to weight gain in the pediatric population (Liu et al., 2022).

At the same time, regular physical activity among children and adolescents plays a key role in maintaining a proper energy balance, preventing overweight, and has a beneficial effect on the metabolic profile. Multidisciplinary interventions combining screen time reduction and physical activity promotion appear to be a promising preventive strategy.

The aim of this review is to synthesize the available scientific evidence on the impact of physical activity and screen time on the development of overweight and obesity in children and adolescents. Particular emphasis was placed on identifying the behavioral mechanisms linking sedentary lifestyles, screen time, and reduced physical activity with energy imbalance. The review also focused on evaluating the effectiveness of anti-obesity interventions that aim to reduce screen time and promote physical activity. In light of the growing number of children suffering from obesity and its consequences, a comprehensive approach is needed that addresses both behavioral and environmental aspects, which may facilitate the development of better prevention and intervention strategies.

2. Methodology

The review was conducted in a narrative format, covering clinical and experimental studies on the impact of physical activity and screen time on obesity and its consequences in children. The study was based on a variety of sources, including prospective and retrospective studies, review articles, meta-analyses, and official reports and guidelines from the WHO and pediatric societies from 2000 to 2025. The literature was selected focusing on studies that provided data on how the amount of physical activity and screen time affect the development of obesity and its complications in the paediatric population.

Inclusion and exclusion criteria

The analysis included peer-reviewed scientific articles, public health reports, and official recommendations from scientific societies that met the following criteria:

- focused on the human population from birth to 18 years of age,
- examined the impact of physical activity, sedentary behavior, and screen time on the risk of developing overweight and obesity in children,
- were published in English or Polish in peer-reviewed scientific journals,
- were published between 2000 and 2025, allowing for the inclusion of changes in children's leisure-time behaviors, particularly those related to the expansion of screen devices.

The review excluded publications that:

- focused solely on the adult population,
- analyzed only screen time or physical activity, without considering their relationship to body weight or obesity risk,
- were unpublished or appeared in non-scientific journals or websites.

Data sources and search strategy:

A literature search was conducted in the following electronic databases: PubMed, Google Scholar, Scopus, and Web of Science between September and December 2025. The following combinations of keywords with logical operators were used: "childhood obesity" AND "physical activity", "childhood obesity" AND "screen time", "physical activity" AND "screen time" AND "children", "physical activity" AND "screen time" AND "children" AND "obesity".

Data analysis

The collected publications were initially selected based on their titles and abstracts and subsequently evaluated for compliance with the inclusion and exclusion criteria. The selected sources were subjected to qualitative synthesis, identifying the impact of a sedentary lifestyle and increased screen time on the development of obesity and its further consequence. Data from the included publications were summarized descriptively, focusing on the quality of evidence, study findings, and recommendations for clinical practice and public health. Due to the narrative nature of the work, no formal assessment of risk of bias or meta-analysis was performed.

3. Results

3.1. The relationship between physical activity and obesity prevention

Reduced physical activity leads to a positive energy balance, which promotes fat accumulation and the development of obesity (Zarzycka & Szara, 2015). Scientific analyses report that regular physical activity (at least 60 minutes per day) has a positive effect on weight reduction and obesity prevention by improving the energy balance (Marcysiak et al., 2010). Epidemiological studies indicate that children with obesity are significantly less physically active, less likely to participate in extracurricular sports, and more likely to avoid physical education classes (Trojanowska et al., 2015). Regular physical activity improves lipid and carbohydrate metabolism, as well as blood pressure, thereby contributing to a reduction in the long-term consequences of obesity (Kupczak-Wiśniowska et al., 2017). In its guidelines, the WHO recommends 60 minutes of moderate or vigorous physical activity for children to prevent obesity (Bull et al., 2020). Family interventions that combine increased physical activity with the implementation of a balanced diet result in weight loss in children aged 0-14 years. (Yang et al., 2022).

3.2. The impact of screen time on the development of obesity

Screen time is strongly correlated with the development of obesity in children. Longer exposure (more than 2 hours per day) is associated with lower levels of physical activity, unhealthy eating habits, and higher BMI (Mazur et al., 2006). The COSI cohort study, conducted between 2022 and 2024, included 470,000 children in Europe and found that 42% of them spent at least 2 hours in front of screens on weekdays and 78% on weekends, which was associated with being overweight, particularly among boys and children with lower socioeconomic status. (WHO, 2025). Prolonged use of screen devices promotes obesity through sleep disruption, reduced physical activity, decreased metabolism, and increased exposure to unhealthy food advertisements, all of which negatively affect children's eating habits (Robinson et al., 2017). Analyses show that spending time in front of screen devices is associated with increased consumption of sugary drinks and snacks, which leads to a higher energy intake during the day (Giammatei et al., 2003). Excessive screen time during childhood is associated with a higher incidence of obesity (Hancox et al., 2004) and elevates the risk of developing metabolic syndrome in adulthood (MacDonell & Hancox, 2023).

3.3. Mechanisms of the impact of screen time and reduced physical activity on obesity

- Reduced energy expenditure by replacing physical activity with prolonged sitting in front of screens, thereby perpetuating a sedentary lifestyle.
- Excessive energy intake due to snacking on high-calorie foods, consuming sugary drinks, and exposure to fast-food advertisements (Fang et al., 2019).
- Disruption of sleep patterns and deterioration in sleep quality caused by excessive use of screen devices, especially in the evening, leading to abnormal secretion of appetite-regulating hormones (leptin, ghrelin) and increased appetite (Bakour et al., 2022).
- Restricted social interaction, which reduces time spent outdoors, limits opportunities for physical activity, and promotes social isolation (Hashemi, 2025).

3.4. Interventions and prevention programs

- Implementation of school programs that increase physical activity and reduce screen time (Lai et al., 2025).
- Family interventions aimed at reducing screen time, often combined with increasing time spent on shared physical activity.
- Use of technological support to monitor screen time, such as timers, apps or activity monitors (Zhang et al., 2022).

Analyses indicate that only integrated interventions (combining education, behavioral changes among family members, and promotion of physical activity) offer a realistic chance of reducing childhood obesity (Wu et al., 2016). Interventions involving parents are also more effective than those aimed solely at children (Maddison et al., 2014).

4. Discussion

A review of the literature indicates that at least 60 minutes of daily physical activity has a positive effect on body weight and the metabolic profile in children by improving energy balance. Increased screen time is associated with higher BMI, unhealthy eating habits, sleep disturbances, and an elevated risk of obesity in both childhood and adulthood. Studies also confirm the synergistic effect of combining reduced screen time and increased physical activity in preventing diseases related to excess weight (Bull et al., 2020; Yang et al., 2022; MacDonell & Hancox, 2023).

4.1. Biological and behavioral mechanisms

Time spent in front of screen devices displaces physical activity in children, thereby reducing energy expenditure (Arluk et al., 2003). Longer screen time is associated with the consumption of high-calorie snacks that exceed dietary requirements. Snacks served on plates are consumed in smaller quantities than those eaten directly from the packaging. Consuming main meals in front of screens also reduces attention to the act of eating, leading to overeating and intake more food than recommended (Ogden et al., 2013; López-Gil et al., 2025). Exposure to blue light, commonly emitted by screens, disrupts circadian rhythms and sleep by shortening sleep duration and reducing sleep quality. Sleep deprivation, in turn, dysregulates the hormonal axis controlling hunger and satiety, which increases the risk of excessive caloric intake (Zhang et al., 2017; Higuchi et al., 2014). Reduced physical activity, increased energy intake from snacking while using screen

devices, and disruptions in satiety due to inadequate sleep contribute to a positive energy balance. Energy intake exceeding energy requirements leads to weight gain and, over time, may result in obesity. Moreover, the frequent consumption of highly processed snack foods during screen time further increases the risk of cardiovascular disease and certain cancers (Mendoza et al., 2024; Fiolet et al., 2018).

4.2. Effectiveness and recommendations for intervention

Comprehensive prevention and remediation programs that promote physical activity during school and extracurricular activities, as well as within the family, can significantly increase the time spent being physically active—from a few minutes per day to several hundred minutes per week. Programs focusing solely on reducing screen time are also effective, although to a lesser extent (Jones et al., 2021; van Sluijs et al., 2007). Studies show that mobile app-based intervention programs significantly increase the time spent on physical activity, reduce the time spent sitting in front of screen devices, and lead to a decrease in BMI (Wang et al., 2024). According to scientific studies, gamification-based interventions, i.e., those using game elements and engaging participants in achieving goals, were able to increase physical activity and also led to a reduction in BMI among the participants in the experiment (Wang et al., 2025). Measures taken to reduce the risk of obesity by reducing screen time and increasing physical activity in children should be multidimensional and focus on the whole family. It is advisable to use methods that engage children, such as movement games, interesting active games, or mobile applications that support activity.

4.3. Limitations and directions for future research

Research on this topic faces a number of limitations due to the short-term nature of the interventions and the predominance of observational studies, which makes it difficult to draw causal conclusions. The questionnaires commonly used to assess screen time and physical activity may be subject to measurement error and distorted by the subjective assessment of researchers. The narrative nature of this study, the heterogeneity of the population described in scientific sources, and the lack of complete control over confounding factors such as diet, sleep, and family environment limit the generalizability of the results.

Future studies should use randomized, long-term, multilevel interventions that combine the phenomena under study. It is also important to use objective measurement methods and analyze indirect mechanisms, such as the impact of the studied factors on sleep or food preferences. The assessment of socially and culturally diverse populations, as well as the study of long-term metabolic effects, will allow for a better determination of the role of lifestyle in the prevention of obesity in children.

5. Conclusions

A review of the literature indicates that both limiting screen time and regular physical activity play a key role in preventing obesity among children and adolescents. Engaging in at least 60 minutes of physical activity per day and limiting screen time correlates with a more favorable body mass index, improved energy balance, and metabolic profile (including lipid parameters (Bull et al., 2020; Yang et al., 2022; Kupczak-Wiśniowska et al., 2017). Extended use of electronic devices with screens is associated with lower physical activity, sleep disturbances, increased consumption of sweetened beverages and high-calorie snacks, which leads to a positive energy balance and promotes overweight and the development of obesity along with its metabolic complications (Robinson et al., 2017; MacDonnel & Hancox, 2023).

The results of the review suggest that limiting screen time and spending more time on daily physical activity can lead to an improved lifestyle and a reduced risk of obesity. Effective prevention programs should be multi-component, include education for children and parents, promote activity in the school environment, and encourage healthy eating and exercise habits. Introducing such measures from early childhood can bring long-term health benefits and reduce the risk of obesity and related metabolic complications (Wu et al., 2016; Wang et al., 2024; 2025; Zhang et al., 2022).

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Author's contribution:

Conceptualisation: Maciej Jakubiec

Methodology: Maciej Jakubiec, Emilia Gąsiorowska

Software: Angelika Jankowska, Gabriela Deska

Check: Anna Wawrzeczko, Martyna Susek, Amadeusz Furmanek

Formal analysis: Martyna Susek, Amadeusz Furmanek

Investigation: Emilia Gąsiorowska, Anna Wawrzeczko, Gabriela Deska

Resources: Emilia Gąsiorowska, Natalia Górską, Katarzyna Wójtowicz

Data curation: Maciej Jakubiec, Katarzyna Wójtowicz, Magdalena Gostół

Writing - rough preparation: Maciej Jakubiec, Katarzyna Wójtowicz

Writing - review and editing: Maciej Jakubiec, Angelika Jankowska, Magdalena Gostół, Natalia Górską, Emilia Gąsiorowska

Project administration: Maciej Jakubiec

All authors have read and agreed with the published version of the manuscript.

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