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The Effectiveness of Nutritional Interventions in Managing Obesity in Adolescents: Review

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Abstract

Background: Obesity has emerged as a significant public health crisis globally, particularly among adolescents, with increasing prevalence linked to lifestyle choices. This review evaluates the effectiveness of nutritional interventions aimed at managing obesity in this demographic.

Methods: A comprehensive literature search was conducted using PubMed from 2009 to 2023, employing the MeSH terms “pediatric obesity,” “childhood obesity,” “primary prevention,” and “diet.” Studies were selected based on their focus on dietary interventions in educational and community settings.

Results: Numerous school-based and community-based interventions were analyzed, highlighting various strategies such as nutrition education, physical activity promotion, and environmental modifications. For instance, the Ballabeina study showed improvements in aerobic fitness and dietary habits, although no significant changes in BMI were observed. Similarly, the Healthier Options for Public Schoolchildren (HOPS) initiative resulted in a higher percentage of children maintaining a normal weight compared to control groups. However, many interventions failed to sustain long-term BMI reductions, indicating the complexity of obesity management.

Conclusion: The review underscores that while dietary interventions can yield positive outcomes regarding physical activity and dietary choices, they often fall short in significantly reducing obesity rates among adolescents. A multifaceted approach that combines nutritional education with environmental changes and policy reforms is essential for effectively addressing adolescent obesity. Future research should focus on long-term effectiveness and the integration of community-wide initiatives.

Keywords: Obesity, Adolescents, Nutritional Interventions, Dietary Habits, Public Health

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Introduction

Recently, there has been a transition from dominant infectious illnesses to a significant incidence of chronic and degenerative diseases linked to lifestyle decisions [1]. Obesity is a disorder that has significantly escalated globally, particularly among youngsters, raising public health concerns. The incidence of overweight and obesity has risen dramatically over the last forty years, and a global epidemiological shift from underweight to overweight and obesity has been documented. The concerning trend has been seen across all areas, including emerging nations, with the prevalence of overweight and obesity rising from 8.1% to 12.9% in boys and from 8.4% to 13.4% in girls between 1980 and 2013. Similar trends have been seen in wealthy nations, where in 2013, 23.8% of boys and 22.6% of girls were classified as overweight or obese [2]. The frequency is much greater in industrialized nations across all age groups, while the disparities between sexes are minimal. Nevertheless, the incidence of pediatric obesity in the United States and several European countries has seemingly stabilized, although it persists at elevated levels [3].

Obesity is a complicated, multifaceted condition. While genetics may significantly contribute to the etiology of obesity, they may not entirely account for the rapid and substantial rise in obesity at the population level [4,5]. This obesity pandemic is thought to result from gene-environment interactions, exacerbated by a more permissive obesogenic environment with varying determinants [6]. Micro-environmental settings, including schools, workplaces, residences, and communities, are impacted by macro-environmental sectors, such as the health system and the food business, which may be critical in addressing the obesity epidemic [7]. Currently, people are increasingly situated in a permissive atmosphere regarding dietary habits and are more prone to adopting sedentary activities. The Ottawa Charter recognized many years ago the need to promote supportive workplaces. For youngsters, the family and school are included within a broader proximal environment [7].

Diet and other habits are established in early childhood and maintained into maturity. Amid the rising prevalence of juvenile obesity, there has been an escalation in research examining the factors of obesity in children and their families, with several studies outlining potential dietary and nutritional treatments to mitigate childhood obesity [8,9]. Interventions primarily reliant on educational, behavioral, or pharmaceutical strategies are mostly ineffective in the prevention and treatment of obesity [10,11]. This research is to evaluate the current literature on dietary treatments for the prevention of pediatric obesity and to determine their efficacy.

1. Methods

A literature search was performed using the PubMed Central® search engine, the most extensive database for biological literature. The search query used the MeSH phrases "(pediatric obesity) OR (childhood obesity) AND (primary prevention) AND (diet)." In light of the vast volume of published data, we restricted the timeline to include publications from 2009 to 2023.

2. Interventions Implemented in Educational Institutions

The Ballabeina study is a cluster-randomized controlled single-blinded trial conducted in several preschools in Switzerland, aimed at examining the impact of a multidimensional lifestyle intervention on aerobic fitness and adiposity, primarily in migrant preschoolers, over the course of one school year [12,13]. The research included 652 preschool children with an average age of 5.1 years. The treatments included a physical activity program, nutrition education, media use guidelines, sleep instruction, and modifications to the preschool's constructed environment. The dietary intervention included weekly nutrition lectures conducted by a dietitian, enabling students to acquire knowledge about balanced nutrition and appropriate food practices in a didactic manner. The lessons focused on five key messages: "drink water," "consume fruits and vegetables," "maintain regular eating habits," "make informed choices," and "turn off screens during meals," created in partnership with the Swiss Society for Nutrition. These messages were also shown on humorous cards that youngsters may receive with the assignment to execute the message at home. Following a four-month intervention, the findings indicated no disparities in the children's body mass index (BMI) across the groups. Nonetheless, an enhancement in aerobic fitness was seen after the conclusion of

the intervention, and children in the intervention group exhibited advantageous effects in body fat percentage (−1.1%) and motor agility, in comparison to the control group children. Benefits were also seen in reported physical activity, media use (reduced screen time in boys), and dietary habits, including an increase in fruit and vegetable intake within the intervention group [13].

A school-based experiment was conducted in the Netherlands with children aged 12 to 14 years (n = 1108) as part of a multimodal health promotion intervention [14,15]. Ten intervention secondary schools and eight control secondary schools were involved. The intervention comprised an educational component featuring biology and physical education classes, alongside a computer-based information program, and an environmental component proposing measures such as offering smaller portion sizes in the canteen, healthier food options, and limiting access to vending machines. Posters were also displayed to enhance awareness about the relative healthiness of various meals. After a twenty-month follow-up, the intervention group exhibited a decrease in body composition metrics, including skinfold thickness, reduced intake of sugar-sweetened drinks at twelve months, and decreased screen time (notably in boys) [14,15].

A school-based obesity-prevention experiment in Chile assessed the impact of weekly physical activity sessions and nutrition education for parents and kids in grades 1 to 8; 2,141 schools were in the intervention group, while 945 were in the control group [16]. Environmental modifications were implemented, including directives for school kiosks to provide healthier alternatives for pupils while maintaining profitability. The findings indicated a decrease in BMI z-scores among boys after a 6-month intervention, along with improved physical fitness in both sexes. Conversely, the alterations in the kiosk's food offerings seemed to have no impact on the students' meal selections [16].

The Healthier Options for Public Schoolchildren (HOPS) is a randomized experiment conducted over two academic years (2004–2005 and 2005–2006) including six elementary schools in Osceola, Florida, with a total of 4,588 children aged 6 to 13 years, of whom 48% were Hispanic. Implemented interventions including alterations to the school cuisine, establishment of school gardens, and enhancement of physical activity [17]. Additionally, monthly newsletters included instruction on good diet and physical exercise for students and parents. After two years, a greater number of kids in the intervention group maintained a normal weight (below the 85th percentile of BMI-for-age) at 52.1%, compared to 40.7% in the control group. The intervention group had enhanced academic performance relative to the control group [17].

The "Shape up Somerville" (SUS) is a non-randomized controlled experiment undertaken over two academic years (September 2003–June 2005) including 1,178 children in grades 1–3 (average age of 8 years) enrolled in public schools across three distinct neighborhoods in Somerville, Massachusetts, United States [18]. This intervention included increased physical activity options inside the school environment, including guidance on safe routes to school and walking to the bus; alterations to the interior space, such as new physical activity equipment; and a food intervention. This encompassed taste tests of fruits and vegetables at lunchtime, allowing children to vote on their inclusion in the monthly school menu; the daily provision of new vegetarian recipes and fresh fruit for breakfast and lunch; the display of vibrant educational posters containing nutrition and health information in the school cafeterias; and the training of food service staff. Furthermore, restaurants were approved by SUS rules to provide low-fat dairy products, lower portion sizes, fruits and vegetables as accompaniments, and prominently displayed indicators of healthier choices. After one year, data indicated that the BMI z-scores were 0.06 lower in the intervention group compared to the control group [18]. The intervention group had a reduction in overweight and obesity and a rise in remission for both sexes; however, the comparator groups were not randomly allocated.

A randomized cluster-controlled trial was conducted in Mexico involving 532 school-aged children from the 2nd and 3rd grades, with a mean age of 8.5 ± 0.73 years at baseline (280 participants in the intervention group and 252 in the control group; each group comprising one public and one private school, totaling four schools). The objective was to encourage these children and their parents to diminish sedentary habits, limit the intake of soft drinks and snacks rich in fat and salt, and enhance the consumption of fruits and vegetables. The intervention included seminars focused on healthy lifestyles for the school board and

teachers, facilitated by nutritionists and physical activity experts. Nutrition graduates conducted interactive lessons for children aimed at enhancing their consumption of fruits and vegetables, promoting physical activity, reducing soda and high-fat, high-salt snack intake, and decreasing television viewing time. Nutrition lessons for parents were conducted by nutrition specialists to educate them on good eating. The findings indicated that during the sixth month of the intervention, the intervention group saw a more significant reduction in BMI compared to the control group (a difference of −0.82 kg/m2 in children's BMI); however, this effect was not maintained in the long run, at 18 and 24 months [19].

A multi-component school nutrition policy initiative aimed at preventing overweight and obesity among children was implemented with 1,349 kids in grades four to six across 10 schools in a U.S. metropolis. This initiative encompassed several interventions: school self-assessment, wherein schools proposed strategies like restricting the use of food as rewards or punishments, encouraging active recess, and providing breakfasts in classrooms to guarantee students consume a nutritious meal; training in nutrition education for school personnel; nutrition education classes for students; implementation of nutrition policies in participating schools, including modifications to the foods sold and served by the Dietary Guidelines for Americans to fulfill nutritional standards; social marketing efforts, such as distributing raffle tickets to students who purchased or brought healthy snacks and beverages from home; and parental outreach facilitated by nutrition educators during home and school association meetings, report card nights, parent education sessions, and weekly nutrition workshops [20]. This initiative resulted in a 50% decrease in the prevalence of overweight individuals. After 2 years, the prevalence of overweight students in the intervention schools was considerably lower (7.5%) compared to the control schools (14.9%). Nonetheless, there were no variations in the incidence or prevalence of obesity, nor the remission of overweight or obesity after a two-year follow-up [20].

Donnelly et al. [21] executed a two-year study including kids in grades three to five throughout two rural Nebraska school districts, to mitigate obesity and enhance physical and metabolic fitness. The strategy included nutritional education, altered school meals, and enhanced physical activity. The meals were coordinated with the culinary workers by Lunchpower! Initiative. This program features meals that are decreased in calories, fat, and salt, according to the Healthy People 2000 goals [22]. The fat consumption is limited to 30% of total calorie intake, salt to 1000 mg, cholesterol to 100 mg, and dietary fiber is raised to 8 to 10 g per day. The instructor conducted nutrition lessons after their training. The curriculum included fundamental nutrition, nutrition for optimal growth and development, the correlation between diet and health, healthy dietary selections, methods to decrease dietary fat, snack options, and food safety protocols. Following two years of intervention, the control school exhibited a significant increase in total energy (9%) and total fat (25%). The control school had much higher levels of salt and lower levels of fiber. Following the first year of intervention, no substantial changes were seen in nutrition knowledge between the control and intervention schools. After two years of instruction, the school decreased incorrect responses about nutrition knowledge by 45%. The control school engaged in far more physical activities outside of school than the intervention school. Following two years of the intervention, neither the control nor intervention schools showed notable improvements in aerobic capacity. Both institutions exhibited no notable changes in body fat percentage, however a substantial rise in BMI was observed [21].

The DECIDE-Children Study [23] is a cluster-randomized controlled study involving 1200 Chinese kids aged 8 to 10 years from four primary schools. The intervention included health education initiatives for parents, oversight, and motivation for children to enhance their physical activity outside of school, school policies aimed at obesity prevention, and health education programs for children. An application named 'Eat Wisely, Move Happily' was developed to disseminate information, monitor children's behavior, manage their weight, and provide feedback to teachers and parents. The findings of this intervention are not yet accessible due to the continuing nature of the research [23].

In 2020, a multicenter randomized controlled trial was conducted involving 4,846 Chinese schoolchildren aged 7 to 13 years. The intervention included the creation of a nutrition handbook distributed to all students, nutrition and health courses for students, parents, teachers, and health workers regarding meal

proportions, healthy food selection, and strategies to minimize consumption of unhealthy fast food, sugar-sweetened beverages, and snacks, as well as the installation of informative posters throughout the school. Courses on physical exercise for parents and physical activity sessions for students were also provided. The intervention group exhibited no substantial enhancements in total food consumption variety; yet, there were notable increases in breakfast meal diversity and a reduction in the intake of some harmful items [24]. The impacts on children's BMI were not examined.

The Abriendo Caminos Program [25] was executed at many schools in Illinois, California, Iowa, Texas, and Puerto Rico, focusing on families with one parent and a kid aged 6–18 years (n = 500). This randomized controlled study included seminars, presentations, and activities focused on nutrition education, family well-being, and physical exercise. No findings from this research are currently available.

A randomized control trial named Healthy Start [26] was conducted in Denmark, targeting school children aged 2 to 6 years (n = 3722). The trial focused on instructing families on enhancing their children's dietary and physical activity habits, mitigating stress, and improving both the quantity and quality of sleep. Activities included culinary courses, exercise-oriented activities aimed at enhancing motor abilities, and access to a website offering food inspiration and suggestions. The intervention's clinical effects on children's growth and body composition metrics were minimal [26].

The FIVALIN Project [27] is quasi-experimental research involving 810 children aged 8 to 12 years and 600 parents in Barcelona. This research included seminars focused on health education and sessions dedicated to sports education. Educational materials, cellphone reminders for parents about workshop dates and times, and films were sent to families to reinforce the health habits promoted during the workshops and sports educational sessions. This research is still in progress; hence, no findings are available at this time.

The CHIRPY DRAGON Intervention [28] was a cluster-randomized controlled study conducted among Chinese schoolchildren with a mean age of 6.15 years (n = 1641). This obesity prevention initiative, oriented towards schools and families, included seminars and family activities aimed at encouraging physical activity and good eating habits, with school assistance to enhance physical activity and the availability of nutritious food. Following a 12-month intervention, the BMI z-scores of children in the intervention group decreased, accompanied by an increase in fruit and vegetable intake, and a reduction in the consumption of sugar-sweetened drinks and unhealthy snacks. In this group, screen time decreased but physical activity climbed [28].

The Kids in Action [29] was a controlled study involving children aged 9 to 12 years from four elementary schools in Amsterdam. The research included sessions with children to create treatments aimed at enhancing their physical activity and promoting good eating habits. This intervention entails modifications to the environment, organizational structures, or instructional strategies, with the implementers potentially including dietitians, sports coaches, or community supermarkets, contingent upon the intervention type. No findings have emerged from this investigation so far.

In 2018, research focused on educational intervention, titled The ABC of Healthy Eating Project, was undertaken in Poland with 464 kids participating. The research included students aged 11 to 13 years. The intervention group participated in an educational program focused on food and lifestyle, while both the intervention and control groups engaged in school activities centered on nutrition and healthy living [30].

3. Community-Centric Initiatives

The MOVE/me Muevo was a randomized community experiment conducted at 30 recreation facilities in San Diego County, involving 541 families with children aged 5 to 8 years, aimed at preventing and controlling childhood obesity. The program included activities in leisure centers and members' residences, along with phone calls from health coaches and the distribution of tip sheets via email. The intervention families received assistance from "Family Health Coaches" who targeted the following nutritional behaviors: enhancing fruit and vegetable intake through alterations in meal and snack purchases and preparation; reducing the consumption of sugar-sweetened beverages by modifying food purchases and imposing limits; increasing healthy food portions by

adjusting consumption habits; minimizing dining out and selecting healthier options when eating out; improving the availability and accessibility of nutritious foods and beverages at home; decreasing screen time and preventing eating in front of the television; and increasing the frequency of family meals. After two years, no significant changes were seen between the control and intervention groups for BMI or waist circumference [31]. Notable alterations were seen in the nutritional domain, namely a decrease in fat and sugary drinks, indicating that individuals found it simpler to adopt better behaviors in this area compared to the more intricate and multifaceted attitudes associated with physical activity [31].

The "Romp & Chomp" is a community-based experiment conducted in Australia with children aged 1 to 5 years (n = 12,000) and their families. Modifications were made to the water supply in childcare facilities, childcare regulations concerning nutritious food and physical exercise, and training in physical activity and nutrition was provided to childcare personnel. The nutrition interventions included: collaboration with Dental Health Services Victoria, which supplied resources such as lunch boxes, drink bottles, and marketing materials for kindergarten children; staff training to reinforce nutrition messages and promote healthy eating choices for children aged 5; support from dental health professionals to engage parents on healthy eating and assist staff in implementing health and nutrition policies; access to a dietitian and other allied health professionals via emails, phone calls, and site visits; and the production and distribution of promotional materials including balloons, stickers, posters, and postcards. Following three years of intervention, the subsample of children aged 3.5 years exhibited significantly reduced mean weight, BMI, and z-score BMI, while the children aged 2 and 3.5 years showed a markedly decreased prevalence of overweight and obesity in comparison to baseline values. The intervention group had a significantly reduced consumption of packaged foods and fruit juice [32].

The Aventuras Para Niños Study is a community-oriented initiative aimed at fostering healthy eating and physical exercise while preventing excessive weight gain in Latino children [33]. The study was conducted in thirteen primary schools, using randomization to allocate them to one of three groups: a family-only intervention, a community-only intervention, or a family-plus community intervention. In the family-exclusive intervention, professionals would either contact families or conduct home visits to discuss strategies for overcoming challenges related to maintaining a nutritious diet and engaging in physical activity. They would demonstrate healthy meal preparation and highlight the advantages of promoting healthy eating and physical exercise among children. The community-focused initiative included enhancing school playgrounds, introducing salad bars, establishing community parks, and providing water bottles in classrooms for pupils. The initiative included the enhancement of physical education resources and the provision of nutritious diets for children, alongside disseminating health-oriented media messages via posters, news outlets, and point-of-choice communications at grocery shops. The family-community intervention included all of the aforementioned approaches. The findings indicated no significant primary impacts for the family or community interventions. Consequently, it is plausible that no significant impacts from family or community interventions were seen in the BMI z-scores of the children when compared to each condition alone. Although there were no notable impacts on children's BMI z-scores, the family intervention altered various obesity-related behaviors in these children, including an increased intake of fruits and vegetables [33].

The EPODE (Ensemble Prévenons l'Obésité Des Enfants/Together Let's Prevent Childhood Obesity) seeks to mitigate childhood obesity via a societal approach that enhances childhood environments, local contexts, and familial standards to facilitate the adoption of healthy lifestyles among children through nutritious eating, active play, and recreation [34]. This program commenced in 2004 across 10 French pilot communities, targeting children aged 1–12 years, their families, and local stakeholders capable of instigating micro-changes in these children and their families through initiatives aimed at promoting improved and balanced dietary habits and consistent engagement in physical activity. Recently, more initiatives have emerged, influenced by the EPODE concept, including the Healthy Weight Communities in Scotland and the JOGG program in the Netherlands [35].

The Pacific Obesity Prevention in Communities (OPIC) Project was conducted in Australia, Fiji, New Zealand, and Tonga during a period of 30 months from 2004 to 2009. This was a multifaceted community-based intervention involving 18,000 secondary school students (aged 12–18 years) from eight ethnic and cultural groups, 60 multidisciplinary research personnel, 300 stakeholders and partner organizations, and 27 postgraduate research students. The treatments differed by location, although all locations focused on decreasing the intake of high-sugar beverages and energy-dense foods while promoting physical exercise. The authors assert that the initiative might provide beneficial outcomes for nutrition and physical activity; nevertheless, the impact on childhood obesity remains little delineated [36].

4. Interventions via Mass Media

Certain strategies aimed at addressing childhood obesity via mass media have focused on imposing limitations on food advertising directed at youngsters. Research indicates that limiting television viewing hours will effectively reduce kid obesity rates, and lowering meals consumed in front of the television is equally significant as enhancing physical activity [37]. Energy-dense foods, beverages, and fast-food corporations often direct their ads at youngsters, since they are very susceptible to influence at a young age, particularly via television commercials. Consequently, minimizing television viewing time may be an effective method to mitigate the incidence of juvenile obesity. Sweden has prohibited television adverts directed toward children under the age of 12. Norway, Denmark, Austria, Ireland, Australia, Greece, and Portugal have implemented prohibitions on advertising directed at minors [38,39].

5. Interventions in the Food Sector

Food taxes are a fundamental preventive strategy now used in several nations, including some regions of the USA and Canada, to diminish the consumption of unhealthy foods and, over time, mitigate health consequences such as obesity [40]. Examples include high-calorie foods with little nutritional benefits, such as carbonated beverages, sweets, and snack items. Portugal has implemented a charge on sugar-sweetened drinks as a measure to decrease their excessive use in the nation. Annual sales of sugar-sweetened drinks declined by 6.58 million liters, resulting in a 21% reduction in consumption relative to the baseline data from the National Dietary Survey [41]. A study on the effect of taxing sugar-sweetened drinks revealed that it significantly reduced obesity cases among teenagers (0.012%), avoiding 0.76 cases annually [41].

Teng et al. indicate that the global introduction of tariffs on sugar-sweetened drinks has effectively decreased their sales and consumption. Evidence indicates that taxing sugar-sweetened drinks may effectively decrease their use and serve as a crucial measure in obesity prevention [42]. Roberts et al. propose that a fiscal policy might significantly reduce the use of high-sugar goods, even in the near term [43].

Another step being used is the incorporation of logos or labels to inform customers about healthier goods, facilitating their selection of nutritious meals. While it does not directly address childhood obesity, it may have indirect benefits. Anastasiou et al. indicated that food labeling may influence consumer dietary consumption; nonetheless, the findings remain equivocal [44]. The efficacy of health-related claims remains ambiguous, potentially yielding both advantages and disadvantages. However, apart from health-related assertions, data suggests that adverse impacts stemming from food labeling are improbable. Consequently, the promotion of food labeling should persist in policy and educational initiatives [44].

An example of this intervention is the “Pick the Trick” Program, implemented in Australia and New Zealand, which offers meals marked with symbols to facilitate customers' identification of healthier options [45]. The WHO European Food and Nutrition Action Plan 2015–2020 designates the implementation of interpretive, consumer-friendly labeling on the front of packaging as a priority policy issue in Europe [46]. While most nations in the area (n = 15) have front-of-pack labeling, a smaller number utilize interpretative systems that assess the relative healthfulness of foods. There is a plan to implement a uniform front-of-pack labeling scheme across all nations. A WHO paper consolidates the current knowledge about the development processes and efficacy of front-of-pack food labeling rules in the WHO European area [47].

Portion sizes have progressively increased during the last four decades in most high-income nations [48,49]. Notwithstanding the escalation in piece sizes, few nations indicate initiatives to diminish them. Most initiatives concentrate on customer knowledge rather than changes in the food and beverage landscape [50].

6. Conclusions

Most nutrition treatments aimed at addressing juvenile obesity mostly emphasize individual instructional strategies rather than environmental modifications to facilitate better behavioral options. The majority were unsuccessful in mitigating childhood obesity. Establishing conditions conducive to healthy habits seems to be the most effective strategy for addressing juvenile obesity. Comprehensive and multifaceted interventions aimed at environmental modifications and the empowerment of people and communities, including families, with macro-policy reforms, can address childhood obesity without exacerbating socioeconomic disparities.

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الملخص

الخلفية :تُعتبر السمنة أزمة صحية عامة كبيرة على المستوى العالمي، خاصةً بين المراهقين، حيث تزداد معدلات انتشارها نتيجة الخيارات المتعلقة بنمط الحياة. تستعرض هذه المراجعة فعالية التدخلات الغذائية التي تهدف إلى إدارة السمنة في هذه الفئة العمرية.

المنهجيات :تم إجراء بحث شامل في الأدبيات باستخدام قاعدة بيانات ®PubMed Central للفترة من 2009 إلى 2023، مع استخدام مصطلحات MeSHمثل "سمنة الأطفال"، "السمنة لدى الأطفال"، "الوقاية الأولية"، و"النظام الغذائي". وتم اختيار الدراسات بناءً على تركيزها على التدخلات الغذائية في البيئات التعليمية والمجتمعية.

النتائج :تم تحليل العديد من التدخلات المدرسية والمجتمعية، التي أبرزت استراتيجيات متنوعة مثل التثقيف الغذائي، وتعزيز النشاط البدني، وإجراء تعديلات بيئية. على سبيل المثال، أظهرت دراسة Ballabeina تحسنًا في اللياقة الهوائية والعادات الغذائية، على الرغم من عدم ملاحظة تغييرات كبيرة في مؤشر كتلة الجسم .(BMI) وبالمثل، حققت مبادرة خيارات أكثر صحة لتلاميذ المدارس العامة (HOPS) نسبة أعلى من الأطفال الذين حافظوا على وزن طبيعي مقارنةً بالمجموعات الضابطة. ومع ذلك، فشلت العديد من التدخلات في تحقيق تخفيضات مستدامة في مؤشر كتلة الجسم على المدى الطويل، مما يشير إلى تعقيد إدارة السمنة.

الخلاصة :تؤكد المراجعة أنه على الرغم من أن التدخلات الغذائية قد تُحقق نتائج إيجابية فيما يتعلق بالنشاط البدني والخيارات الغذائية، إلا أنها غالبًا ما تخفق في تحقيق تخفيضات كبيرة في معدلات السمنة بين المراهقين. يُعد اتباع نهج متعدد الجوانب يجمع بين التثقيف الغذائي والتغيرات البيئية والإصلاحات السياسية أمرًا ضروريًا لمعالجة السمنة لدى المراهقين بشكل فعّال. ينبغي أن تركز الأبحاث المستقبلية على فعالية التدخلات طويلة المدى ودمج المبادرات المجتمعية الواسعة النطاق.

الكلمات المفتاحية :السمنة، المراهقون، التدخلات الغذائية، العادات الغذائية، الصحة العامة.