

Addressing Childhood Obesity for Type 2 Diabetes Prevention: Challenges and Opportunities

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■ **IN BRIEF** Addressing the problem of childhood obesity is an important component of preventing type 2 diabetes. Although children and their families ultimately make decisions about diet, physical activity, and obesity management, many groups have a role in making these choices easier. They do this by providing families with tools and resources and by implementing policies and practices that support a healthy diet and physical activity in the places where children and their families spend their time. Diabetes educators are an important part of the solution.

Among youth, diabetes is relatively rare; ~193,000 Americans (0.24%) <20 years of age have the diagnosis of either type 1 or type 2 diabetes (1). However, the incidence of type 2 diabetes has increased in youth. One study reported an annual adjusted increased incidence of 4.8% between 2002 and 2012 (2). The earlier an individual develops type 2 diabetes, the higher their lifetime risk of diabetes complications such as heart disease, vascular disease, vision loss, and amputation will be (3).

Although a number of causes may explain the increase in type 2 diabetes among youth, the increase in childhood obesity likely plays a major role. Obesity affects the body's ability to use insulin, therefore causing abnormal blood glucose levels (4). In the United States, childhood obesity doubled from 10% in 1999–2000 to 19% in 2015–2016, with >18 million children currently having obesity (5,6). This parallels the increase of type 2 diabetes in youth (2).

Type 2 diabetes is largely preventable. Addressing the problem of childhood obesity and its related risk factors of unhealthy diet and physical

inactivity is part of the solution and will have health benefits beyond the prevention of type 2 diabetes. In addition to being at higher risk for type 2 diabetes, children with obesity also are more likely to have other risk factors for chronic disease, such as high blood pressure and abnormal lipid levels (7,8). They also experience more bullying, stigmatization, and lower self-esteem (9,10). In addition, children with obesity are more likely to have obesity as an adult (11), and adult obesity is associated with a higher risk for type 2 diabetes (12), heart disease (12), some cancers (13), and complications during pregnancy (14).

Because of the complexity of the problem of childhood obesity, expert groups such as the Institute of Medicine and the Centers for Disease Control and Prevention (CDC) have long recognized that the solution would need a multi-level, multi-pronged approach. This approach involves multiple groups, including individuals; families; health care organizations; public health organizations; community settings; federal, state, and local agencies; and the private sector (15–17). This article briefly describes the risk factors for child-

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hood obesity and the roles different groups can play in addressing obesity prevention and management. It closes by specifically identifying how diabetes educators can help reduce childhood obesity.

Preventing Unhealthy Weight Gain

Weight gain is a normal part of healthy development in children. Obesity prevention focuses on limiting weight gain to only what is needed for normal growth and optimal development. Children and families, as well as the communities in which they live, all have roles in obesity prevention.

Obesity prevention begins with children and their families. Starting early is key because children who are overweight as they enter kindergarten are four times more likely than their peers with a healthy weight to have obesity by eighth grade (18). Prevention activities can begin with a mother before a child is born. Prenatal exposures such as excessive maternal weight gain during pregnancy, gestational diabetes, tobacco use during pregnancy, and higher pre-pregnancy weight status all have been associated with childhood obesity (19–21).

Once a child is born, breastfeeding may also help prevent obesity; longer breastfeeding has been associated with a lower likelihood of childhood obesity in some, although not all, studies (22). Even as the evidence builds about the potential link between breastfeeding and healthy weight, breastfeeding has additional benefits for the mother and child and should be encouraged as the best first source of nutrition (23).

Maintaining healthy dietary patterns throughout childhood is an important obesity prevention strategy. As complementary foods are added to an infant's diet, an opportunity for establishing healthy eating patterns arises. Preferences and distinctions for sweet and salty tastes and foods begin in infancy (24).

As children transition to a “family diet,” caregivers' and family members' actions continue to shape their eating preferences and habits.

Dietary patterns consistent with the 2015–2020 Dietary Guidelines for Americans (DGA) are linked to better weight management, as well as improved health in general (25). These patterns include higher amounts of fruits, vegetables, and whole grains; moderate amounts of lean proteins; and lower amounts of processed foods, including those with added sugars, refined grains, and sodium. Resources such as the U.S. Department of Agriculture (USDA) MyPlate nutrition plan can guide parents in how to help their children's diet align with these patterns (26).

Whether specific foods and beverages contribute differentially to excess weight gain is not clear. The consumption of sugar-sweetened beverages has been linked to weight gain in children and adults (27); one review found that, among 17 foods or beverages, sugar-sweetened beverages were most consistently associated with excess weight gain (28). A more recent review found that, in general, the positive association is found when studies are limited to children <12 or to children <5 years of age (29).

In addition to poor diet, physical inactivity is another risk factor for childhood obesity (30). The 2008 Physical Activity Guidelines for Americans indicate that children ≥ 6 years of age need at least 60 min/day of physical activity for good health (31). Parents can help children be active by providing time for structured and unstructured activity, providing positive feedback, and encouraging children to try different types of physical activities (31).

Shorter sleep duration is a third risk factor for obesity (32). The recommended daily amount of sleep for optimal health ranges from 12 to 16 hours per 24-hour period for infants aged 4–12 months to 8–10 hours for teens aged 13–18 years (33). Parents can facilitate quality sleep through

establishing regular bedtimes and limiting the use of televisions and other screens shortly before bedtime and in the bedroom (34).

Obesity prevention efforts need to expand beyond the family, however. Despite their best efforts, families face barriers as they try to instill healthy habits in their children. These barriers include lack of time (35), lack of information about topics such as how to prepare healthy family meals (35), limited access to affordable healthy foods (35), and a lack of safe and accessible places for their children to play and be physically active (35,36). Furthermore, as children grow older, they spend increasing amounts of time in places outside of the home. The quality of these places can also make it easier or harder for children to eat healthier and be active. Practices and policies in childcare facilities, schools, and other community venues can reduce the barriers for children and their families in achieving and maintaining a healthy weight for children and are described in more detail below.

Childcare facilities and schools are important settings for supporting healthy behaviors because many children spend extended periods of time in them. Supports for healthy behaviors in childcare facilities and schools can be incorporated into individual facilities or across facilities through statewide policies and regulations such as licensing, staff training requirements, or state curriculum standards (15–17,37–39). For childcare facilities, states can also add obesity-related standards to quality rating and improvement systems (QRIS) to give facilities higher ratings when they incorporate activities and policies that promote a health weight; approximately one-half of states have included such standards in their QRIS (40).

A number of strategies can be employed in individual facilities to bring about system-level changes for healthier eating and physical activity. Individual childcare facilities and

schools can help children be more active by scheduling regular times for physical activity (16,37,39). In childcare settings, this can include designated time for structured and unstructured play, whereas in schools, this can include physical education classes and recess. Schools can also offer opportunities for physical activity outside of physical education. For example, they can offer intramural and extramural sports for youth at all levels of ability (37). Schools and other community venues can implement shared use agreements to increase access for physical activity for all community members (e.g., opening gyms, playgrounds, and tracks) (17). Childcare facilities and schools can encourage healthy eating consistent with the DGAs by serving healthier foods and beverages such as fruits and vegetables, whole grains, and lower-fat dairy products and limiting access to less healthy foods containing high amounts of sugar, sodium, or saturated fat (17,37–39). Changes can be made in foods and beverages offered in cafeterias, vending machines, and at special events and can address both meals and snacks. School curriculums can include information about diet and activity (37). Tools such as the Health Education Curriculum Analysis Tool can help schools determine whether their curriculums are likely to promote healthy behaviors (41). Both childcare facilities and schools can avoid using food or physical activity as a reward or punishment (37). In addition, teachers and staff in both facilities can model positive healthy behaviors.

Outside of childcare facilities and schools, the community at large also has a role in obesity prevention. Communities can help children be more active by providing places for activity and by making it safer and easier for children and families to walk or bike to these and other destinations (17,42,43). Examples of activity-friendly places for children include parks, playgrounds, and recre-

ation centers. Activity-friendly routes include well-maintained sidewalks and roads that have enforced speed limits, pedestrian-friendly intersections, and lanes that allow cyclists to ride safely. Many community groups, including those involved in planning, transportation, health, law enforcement, and education, have a role to play in making these changes happen. They can provide expertise, financial resources, programming, and space or help with interpreting and enforcing current laws and regulations (43).

To encourage healthy diets, communities can improve access to healthier and affordable foods, especially for individuals at highest risk for obesity, type 2 diabetes, and other chronic conditions. For example, community decision-makers can include economic or zoning incentives for supermarkets and farmers' markets to locate in low-income communities (16,17) and ensure that affordable public transportation to these places is available (16). In addition, government facilities embedded in communities can adopt healthy food policies that support access to healthy foods and beverages in their cafeterias, vending machines, and other food service venues (17,44).

These interventions to change the food environment, by themselves, may not change diet or weight status and may need to be combined with efforts to promote the new or improved venues and get people to purchase healthier choices once they come to the venue. For example, one study found that an intervention that added a new supermarket to a Philadelphia, Pa., neighborhood did not lead to changes in fruit and vegetable consumption or obesity for residents (45). The authors suggested that one reason for the finding was that the store was underused.

Like families, however, communities also experience barriers related to implementing these changes; these include limited understanding of what is needed to make changes

(46,47), limited resources (46–48), and competing priorities (46).

A number of CDC programs have helped states and communities address these barriers by providing financial resources and technical assistance. For example, through CDC funding, the Ohio Department of Health partnered with the Ohio Child Care Resources & Referral Association and Children's Hunger Alliance to provide more than 1,600 childcare centers, preschools, and home-based childcare programs with educational resources, training, and technical assistance on healthy eating and physical activity best practices for young children.

In addition to CDC programs, other federal programs and policies can also play a role in ensuring that children have access to healthier foods and opportunities for physical activity. For example, the USDA's National School Lunch Program and Child and Adult Food Program link the receipt of federal funding to the provision of healthier foods (49,50) and the implementation of school wellness policies (49).

Broader federal and state level policies can also be synergistic with local work. For example, only half of U.S. high school students participate in physical education at least once per week (51). Effectively addressing this gap will likely take a combination of policies at the government level that require specific amounts of physical education and adequate resources and training at the school level to implement the policies (16,52).

Obesity Management

Because of the large number of children with obesity, the problem of childhood obesity cannot be addressed solely through prevention efforts. Children with obesity often need focused and intensive intervention that starts in the health care setting.

In 2017, the U.S. Preventive Services Task Force (USPSTF) updated and confirmed a previous

recommendation that clinicians screen all children ≥ 6 years of age for obesity and, for children with obesity, offer or refer them to family-based comprehensive counseling and behavioral treatment interventions (i.e., pediatric weight management programs). These programs should have at least 26 contact hours over 2–12 months (53). Pediatric weight management programs can help children achieve a healthier weight by addressing the skills and efficacy of the child and the family to improve dietary patterns, increase physical activity, and improve sleep.

Uptake of the USPSTF recommendation has been limited by a small number of evidence-based programs across the country and struggles to fund programs in the long term. For example, in a 2013 survey of children's hospitals, only two-thirds of respondents with weight management programs indicated that the program met the USPSTF recommendation, and more than half of programs were operating at a financial loss (54). Implementation of the USPSTF guideline is also limited by family barriers such as readiness to participate in a program and the ability to schedule and get to multiple clinical appointments (55). Adequate coverage for services is also a barrier (56).

Recently, a group of cross-sector experts and stakeholders in obesity management identified strategies that could be used more effectively to move evidence-based interventions into routine clinical care. These strategies included integrating obesity treatment into a chronic care model, using multidisciplinary teams to deliver obesity interventions, ensuring that members of these teams have adequate training and resources, and developing payment models that cover children needing services (56).

Several programs also have the potential to improve the uptake of the USPSTF recommendation. For example, the Healthy Weight Partnership offers a program called “Mind, Exercise, Nutrition, Do It”

(MEND) in various settings (e.g., clinics, schools, and community centers) in the United States. The YMCA adapted MEND and is rolling out a version of this program called “Healthy Weight in Your Child” in YMCA sites across the country. This 4-month, family-based weight-management program focuses on helping children aged 7–13 years reach a healthy weight by working with them to improve their diet and increase their physical activity.

The CDC's Childhood Obesity Research Demonstration (CORD) project is testing models to address the needs of low-income families. CORD focuses on how to increase obesity screening, counseling, and referral to quality weight management programs for these high-risk families. Lessons learned from CORD will accelerate the expansion of similar programs.

Role of Diabetes Educators

In addition to the multiple groups identified above, diabetes educators can also be a part of solving the problem of childhood obesity. In working with people with diabetes, diabetes educators are likely already seeing children with obesity and helping them and their families achieve and maintain healthy weights. For example, many diabetes educators already bring in the families of patients to help inform and empower them to support the patient in managing their condition. Diabetes educators provide counseling to families on how to improve nutrition and physical activity. Examples include teaching families how to shop for and cook healthy foods and how to incorporate physical activity into daily routines. Although this counseling may be directed specifically at diabetes management, it can also help with weight management.

Diabetes educators can also link patients to community resources. Families can be struggling with a variety of health-related social needs that make it difficult for them to eat healthier or be more active. For exam-

ple, they may not have enough money for healthier foods or adequate transportation to get to a grocery store. They also may not be aware of places in their community where stores accept food assistance vouchers or where they can be physically active.

Diabetes educators can assess barriers to improving nutrition or physical activity through targeted questions about families' specific struggles, systematically identify a list of community resources that might help address their needs and the needs of the overall patient population, and refer families to these resources. Examples might include the locations of nearby parks, farmers' markets, or food banks or information on how to apply for the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) or other food assistance. The types and availability of these resources vary by community. However, information about them may be found by contacting local government offices or nonprofit groups; examining local, state, and federal websites; or using apps that identify nearby amenities. Active follow-up and problem-solving by diabetes educators can help patients address barriers they might experience when attempting to access these community resources (57).

In addition to their interactions with individual patients or small groups of patients, diabetes educators can also support obesity prevention in their community. As trusted community members, diabetes educators can educate decision-makers about their role in supporting the health of community members. For example, educators can learn about the health needs of their community by becoming familiar with findings from community needs assessments or other sources of community data. They can then look for opportunities to participate in community planning efforts that address needs such as safe and accessible roads and sidewalks for walking and bicycling or a lack of

local stores that sell healthier foods. They can talk with leaders in schools, childcare facilities, or worksites about the evidence-based programs and policies that could be implemented in these facilities (15–17,37–39,42,43).

Diabetes educators can also help make their own workplaces models for other community workplaces. For example, they can work with their worksite health coordinators to integrate nutrition standards for foods served and sold into facility policies and practices (44). This will help workers and patients have access to healthier foods while at the facility.

Conclusion

Addressing the problem of childhood obesity is an important component of preventing type 2 diabetes. Many groups have a role in addressing the problem through working with individual children and their families to improve diet and increase physical activity or making it easier for everyone to implement these healthy behaviors in the places where they spend their time. Diabetes educators are an important part of the solution.

Disclaimer

The findings and conclusions of this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Duality of Interest

No potential conflicts of interest relevant to this article were reported.

Author Contributions

D.A.G. and J.P.G. reviewed the literature and wrote the manuscript. All four authors contributed to discussion and reviewed/edited the manuscript. D.A.G. is the guarantor of this work and, as such, takes responsibility for the accuracy of the information presented.

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