

Treatment of Pediatric Obesity

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The prevalence of childhood overweight has more than tripled in the past several decades.¹ Nationally, 26% of children age 2-5 years, 37% of grade school children and 34% of adolescents are overweight (Body Mass Index [BMI] for age and gender $\geq 85^{\text{th}}$ percentile but $< 95^{\text{th}}$ percentile) or obese (BMI for age and gender $\geq 95^{\text{th}}$ percentile).¹ Rhode Island's children rank 15th in terms of the number of children who are overweight or obese.² However, although RI ranks well in comparison to the rest of the country, 27% of children age 10-17 are considered overweight or obese. African American and Hispanic children have increased their rates of obesity almost 5-fold.³ Between age groups, there is a significant jump in prevalence between preschool children and grade school children, suggesting the need for early intervention and prevention measures.

Overweight children have a higher risk of becoming overweight adults,⁴ troubling because of the association between obesity and increased risk of cardiovascular changes as well as diabetes mellitus, hypertension and hypercholesterolemia in adulthood.⁵ Evidence suggests that the tracking of obesity into adulthood is a strong predictor of adult cardiovascular risk and that overweight children who are overweight adults have worse cardiovascular disease as they age.⁶ The rise in obesity has also been linked to the increasing rates of type 2 diabetes being diagnosed in childhood: 45% of the cases of newly diagnosed diabetes mellitus in childhood are Type 2 rather than Type 1.⁷ Being overweight has social consequences as well, including, for some children, a lower quality of life,⁸ and increased rates of teasing, bullying, and depression.⁹ Healthy People 2010 has targeted the reduction of childhood overweight as an important goal for the nation.¹⁰

BEHAVIORAL FACTORS ASSOCIATED WITH INCREASING RATES OF PEDIATRIC OBESITY

A number of factors have led to the growing rates of pediatric obesity. Genetic influences play a role, but the rate at which obesity has increased over a relatively short period of time points also to environmental factors. In the broadest sense, children and adolescents have increased their intake of energy-rich foods while energy expenditure has steadily declined. This has led to an imbalance that favors development of excess weight. More specifically, children and adolescents have increased the time spent in sedentary activities: estimates suggest

that children spend greater than 25% of their waking hours in front of the television.¹¹ Nationally, one study found that 55% of adolescents did not achieve the recommended 60 minutes of moderate to vigorous physical activity per day.¹² In a recent RI study, only 51% of children ages 2-12 years achieved that recommended activity-time.¹³

At the same time, most children and adolescents do not meet the dietary guidelines for 5 or more servings of fruits and vegetables daily. In RI, children 2-12 years of age, on average, only consume 1 1/2 servings of vegetables per day.¹³ Furthermore, sweet and salty snack foods and sweeteners/sweetened drinks account for almost 1/3 of children's overall energy intake.¹⁴ In addition, changes in eating patterns over the past 20-30 years favor the development of excess weight. Families consume more food outside of the home, which results in increased energy intake due to the higher caloric and fat content in these foods,¹⁵ as well as the larger portions.¹⁵

POPULATION-BASED APPROACHES FOR PREVENTION OF OBESITY

Prevention of obesity is a long-term objective for reversing the epidemic of pediatric obesity, with increasing focus on policy change. Toward this end, the last five years have seen a significant increase in local, state, and national policy initiatives geared to the prevention and reduction of childhood obesity.¹⁶ At the national level, federal legislation mandates the formation of school district "wellness committees" to improve the nutrition and physical activity environments of schools. Rhode Island has passed two legislative initiatives to promote access to healthier foods in schools: the first eliminates the sale of sugar sweetened beverages; the second requires that all foods in vending machines and sold a la carte in school cafeterias meet nutrition standards. It is too soon to evaluate the efficacy of these strategies in reducing or preventing pediatric obesity.

CLINICAL WEIGHT CONTROL INTERVENTIONS FOR CHILDREN AND ADOLESCENTS

Policy initiatives are geared towards children and adolescents regardless of weight status, and do not directly address the concerns of children who are already overweight. Considerable numbers of children and adolescents are overweight or obese and need intervention ef-

forts. Treatment approaches that have been most extensively investigated are "lifestyle interventions", focused on developing healthier eating and activity habits that can be maintained long-term. Comprehensive lifestyle approaches typically target changes in diet and physical activity, coupled with behavioral strategies to support implementation. Several reviews address the efficacy of lifestyle intervention for treatment of pediatric obesity¹⁷ as well as recent quantitative analysis of pediatric obesity treatments.¹⁸ We provide here a summary of intervention strategies and supporting evidence.

Lifestyle interventions for children and adolescents who are overweight are often delivered in a group setting and incorporate several common components. These include dietary restriction, physical activity prescription, behavior modification strategies, such as self-monitoring of diet and physical activity, stimulus control strategies, and contingency management, as well as varying levels of parental involvement. Considerable evidence supports the efficacy of comprehensive behavioral weight management interventions with school age children, while fewer studies have been conducted on the efficacy of interventions with adolescents.¹⁹ Decreases of approximately 5% to 20% overweight have been observed in treatment studies with children between the ages of 8 and 12 years immediately following intervention. A recent meta-analysis found that lifestyle interventions demonstrated significant effects in decreasing pediatric obesity when compared to waitlist/no treatment controls or education-only comparison groups.¹⁸

Randomized behavioral weight control trials targeting adolescents demonstrate variable findings. Treatment studies conducted with adolescents in outpatient settings indicate weight losses ranged from 1-4 kilograms (kg). Some studies have produced much larger losses, although these trials were conducted over 20 years ago and environmental changes have occurred during this time, potentially making weight control more challenging. A randomized trial combining group-based behavioral treatment with one of two different activity interventions (peer enhanced adventure therapy or supervised aerobic exercise) demonstrated an average reduction of 1.75 BMI units across intervention conditions,¹⁶ with no significant differences between groups. A recent review concluded that, despite multiple methodological limitations, comprehensive interventions involving behavioral strategies com-

bined with attention to diet and physical activity showed promise in decreasing adolescent obesity.¹⁷

Given the increased prevalence of morbid obesity in children and adolescents, intensive interventions have become viable treatment options for morbidly obese adolescents. Treatments provided in residential and inpatient settings^{22,23} as well as pharmacotherapy (i.e. sibutramine, orlistat) either used alone or in combination with behavioral approaches show some promise in promoting weight loss.^{24,25} Additional research is needed to ensure that pharmacotherapy is a safe and effective alternative for treatment of obesity in adolescents.³ Finally, bariatric surgery (i.e. Roux-en-Y gastric bypass, gastropasty, and gastric banding) is increasingly used with severely obese adolescents who have not been responsive to other approaches. However, it is recommended that surgery not be used with children under 13 years of age due to their inability to truly weigh the risks and benefits of such an approach for weight loss. It has also been recommended that bariatric surgery be used with caution in adolescents.²⁶ For example, more conservative selection criteria than that used with adults, including BMI ≥ 40 kg/m² and presence of medical comorbidity, is recommended for deciding whether an adolescent is a candidate for surgery.²⁶

ONGOING RESEARCH TO ENHANCE TREATMENT FOR CHILD AND ADOLESCENT OBESITY

While there are evidenced-based interventions for treatment of pediatric obesity, there is continued need to improve treatment approaches to enhance weight loss outcomes and maintenance of weight loss. Research conducted at the **Weight Control and Diabetes Research Center (WCDRC)** at the Miriam Hospital and the Warren Alpert Medical School of Brown University targets three areas: 1) the influence of parenting behaviors on changes in eating and activity habits, 2) the role of parents in adolescent weight control efforts, with particular focus on effective communication styles within families, and 3) the role of enhancing sleep duration in children to promote changes in eating patterns associated with healthier weight. Each of these areas will be reviewed below.

We currently have a pediatric weight control research program for overweight children age 5-12 years and their parents. The program teaches parents how to help their children develop healthy eating and physical activity habits. The objective is to identify and enhance parenting behaviors that are key to supporting healthy weight in children.

A second area of research focuses on factors that enhance adolescent weight control efforts. One investigation seeks to identify strategies for parent involvement that maximize weight loss outcomes for adolescents. As part of the program, parents are asked to monitor their own weight control behaviors, as well as to improve communication with their teen, particularly related to eating and physical activity. A second study focuses on identifying weight control strategies of adolescents and young adults who have been successful in losing weight and maintaining that loss. The goal is to use "lessons learned" from successful weight-lossers to develop interventions.

A final area of research addresses the potential relationship between obesity risk and children's sleep duration. Research suggests that insufficient sleep is associated with increased risk for obesity in children through its influence on hormones that regulate hunger, appetite, and food intake.²⁷ However, it is unclear whether improving children's sleep leads to improvements in children's weight status. Two studies at the WCDRC are addressing this question. The first is determining whether increasing sleep duration in children 8-11 years old who sleep 9 1/2 hours or less each night is associated with decreased hunger and appetite, decreased reinforcing value of food (i.e. how motivated children are to obtain food), and decreased overall food intake. The second study uses an experimental design to test the same hypotheses. In this study, children 8-11 years old who sleep between 9 and 10 hours per night are asked to sleep their typical amount, increase their sleep by 1 1/2 hours and decrease their sleep by 1 1/2 hours for one week each. Results will further our understanding of the potential role of sleep duration in the current pediatric obesity epidemic.

Collectively, the research at the WCDRC promises to inform the development of more effective intervention strategies for overweight children and adolescents.

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The authors have no financial interests to disclose.

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