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**Prevention of Pediatric Overweight and Obesity**  
Committee on Nutrition  
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# AMERICAN ACADEMY OF PEDIATRICS

## POLICY STATEMENT

Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of All Children

Committee on Nutrition

### Prevention of Pediatric Overweight and Obesity

**ABSTRACT.** The dramatic increase in the prevalence of childhood overweight and its resultant comorbidities are associated with significant health and financial burdens, warranting strong and comprehensive prevention efforts. This statement proposes strategies for early identification of excessive weight gain by using body mass index, for dietary and physical activity interventions during health supervision encounters, and for advocacy and research.

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ABBREVIATION. BMI, body mass index.

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#### INTRODUCTION

Prevention is one of the hallmarks of pediatric practice and includes such diverse activities as newborn screenings, immunizations, and promotion of car safety seats and bicycle helmets. Documented trends in increasing prevalence of overweight and inactivity mean that pediatricians must focus preventive efforts on childhood obesity, with its associated comorbid conditions in childhood and likelihood of persistence into adulthood. These trends pose an unprecedented burden in terms of children's health as well as present and future health care costs. A number of statements have been published that address the scope of the problem and treatment strategies.<sup>1-6</sup>

The intent of this statement is to propose strategies to foster prevention and early identification of overweight and obesity in children. Evidence to support the recommendations for prevention is presented when available, but unfortunately, too few studies on prevention have been performed. The enormity of the epidemic, however, necessitates this call to action for pediatricians using the best information available.

#### DEFINITIONS AND DESCRIPTION OF THE PROBLEM

Body mass index (BMI) is the ratio of weight in kilograms to the square of height in meters. BMI is widely used to define overweight and obesity, because it correlates well with more accurate measures of body fatness and is derived from commonly available data—weight and height.<sup>7</sup> It has also been correlated with obesity-related comorbid conditions in

adults and children. Clinical judgment must be used in applying these criteria to a patient, because obesity refers to excess adiposity rather than excess weight, and BMI is a surrogate for adiposity. The pediatric growth charts for the US population now include BMI for age and gender, are readily available online (<http://www.cdc.gov/growthcharts>), and allow longitudinal tracking of BMI.<sup>8</sup>

BMI between 85th and 95th percentile for age and sex is considered at risk of overweight, and BMI at or above the 95th percentile is considered overweight or obese.<sup>9,10</sup> The prevalence of childhood overweight and obesity is increasing at an alarming rate in the United States as well as in other developed and developing countries. Prevalence among children and adolescents has doubled in the past 2 decades in the United States. Currently, 15.3% of 6- to 11-year-olds and 15.5% of 12- to 19-year-olds are at or above the 95th percentile for BMI on standard growth charts based on reference data from the 1970s, with even higher rates among subpopulations of minority and economically disadvantaged children.<sup>10,11</sup> Recent data from the Centers for Disease Control and Prevention also indicate that children younger than 5 years across all ethnic groups have had significant increases in the prevalence of overweight and obesity.<sup>12,13</sup> American children and adolescents today are less physically active as a group than were previous generations, and less active children are more likely to be overweight and to have higher blood pressure, insulin and cholesterol concentrations and more abnormal lipid profiles.<sup>14,15</sup>

Obesity is associated with significant health problems in the pediatric age group and is an important early risk factor for much of adult morbidity and mortality.<sup>15,16</sup> Medical problems are common in obese children and adolescents and can affect cardiovascular health (hypercholesterolemia and dyslipidemia, hypertension),<sup>14,17-19</sup> the endocrine system (hyperinsulinism, insulin resistance, impaired glucose tolerance, type 2 diabetes mellitus, menstrual irregularity),<sup>20-22</sup> and mental health (depression, low self-esteem).<sup>23,24</sup> Because of the increasing incidence of type 2 diabetes mellitus among obese adolescents and because diabetes-related morbidities may worsen if diagnosis is delayed, the clinician should be alert to the possibility of type 2 diabetes mellitus in all obese adolescents, especially those with a fam-

ily history of early-onset (younger than 40 years) type 2 diabetes mellitus.<sup>25</sup> The psychological stress of social stigmatization imposed on obese children may be just as damaging as the medical morbidities. The negative images of obesity are so strong that growth failure and pubertal delay have been reported in children practicing self-imposed caloric restriction because of fears of becoming obese.<sup>26</sup> Other important complications and associations include pulmonary (asthma, obstructive sleep apnea syndrome, pickwickian syndrome),<sup>27–32</sup> orthopedic (genu varum, slipped capital femoral epiphysis),<sup>33,34</sup> and gastrointestinal/hepatic (nonalcoholic steatohepatitis)<sup>35</sup> complications. All these disturbances are seen at an increased rate in obese individuals and have become more common in the pediatric population. The probability of childhood obesity persisting into adulthood is estimated to increase from approximately 20% at 4 years of age to approximately 80% by adolescence.<sup>36</sup> In addition, it is probable that comorbidities will persist into adulthood.<sup>16,37</sup> Thus, the potential future health care costs associated with pediatric obesity and its comorbidities are staggering, prompting the surgeon general to predict that preventable morbidity and mortality associated with obesity may exceed those associated with cigarette smoking.<sup>10,38</sup>

Although treatment approaches for pediatric obesity may be effective in the short term,<sup>39–44</sup> long-term outcome data for successful treatment approaches are limited.<sup>45,46</sup> The intractable nature of adult obesity is well known. Therefore, it is incumbent on the pediatric community to take a leadership role in prevention and early recognition of pediatric obesity.

### RISK FACTORS

Development of effective prevention strategies mandates that physicians recognize populations and individuals at risk. Interactions between genetic, biological, psychologic, sociocultural, and environmental factors clearly are evident in childhood obesity. Elucidation of hormonal and neurochemical mechanisms that promote the energy imbalance that generates obesity has come from molecular genetics and neurochemistry. Knowledge of the genetic basis of differences in the complex of hormones and neurotransmitters (including growth hormone, leptin, ghrelin, neuropeptide Y, melanocortin, and others) that are responsible for regulating satiety, hunger, lipogenesis, and lipolysis as well as growth and reproductive development will eventually refine our understanding of risk of childhood overweight and obesity and may lead to more effective therapies.<sup>47,48</sup>

Genetic conditions known to be associated with propensity for obesity include Prader-Willi syndrome, Bardet-Biedl syndrome, and Cohen syndrome. In these conditions, early diagnosis allows collaboration with subspecialists, such as geneticists, endocrinologists, behavioralists, and nutritionists, to optimize growth and development while promoting healthy eating and activity patterns from a young age. For example, data suggest that growth hormone may improve some of the signs of Prader-Willi syndrome.<sup>49–51</sup>

It has long been recognized that obesity “runs in

families”—high birth weight, maternal diabetes, and obesity in family members all are factors—but there are likely to be multiple genes and a strong interaction between genetics and environment that influence the degree of adiposity.<sup>47,48,52,53</sup> For young children, if 1 parent is obese, the odds ratio is approximately 3 for obesity in adulthood, but if both parents are obese, the odds ratio increases to more than 10. Before 3 years of age, parental obesity is a stronger predictor of obesity in adulthood than the child’s weight status.<sup>54</sup> Such observations have important implications for recognition of risk and routine anticipatory guidance that is directed toward healthy eating and activity patterns in families.

There are critical periods of development for excessive weight gain. Extent and duration of breastfeeding have been found to be inversely associated with risk of obesity in later childhood, possibly mediated by physiologic factors in human milk as well as by the feeding and parenting patterns associated with nursing.<sup>55–58</sup> Investigations of dietary factors in infancy, such as high protein intake or the timing of introduction of complementary foods, have not consistently revealed effects on childhood obesity. It has been known for decades that adolescence is another critical period for development of obesity.<sup>59</sup> The normal tendency during early puberty for insulin resistance may be a natural cofactor for excessive weight gain as well as various comorbidities of obesity.<sup>60</sup> Early menarche is clearly associated with degree of overweight, with a twofold increase in rate of early menarche associated with BMI greater than the 85th percentile.<sup>61</sup> The risk of obesity persisting into adulthood is higher among obese adolescents than among younger children.<sup>54</sup> The roles of leptin, adiponectin, ghrelin, fat mass, and puberty on development of adolescent obesity are being actively investigated. Data suggest that adolescents who engage in high-risk behaviors, such as smoking, ethanol use, and early sexual experimentation also may be at greater risk of poor dietary and exercise habits.<sup>62</sup>

Environmental risk factors for overweight and obesity, including family and parental dynamics, are numerous and complicated. Although clinical interventions cannot change these factors directly, they can influence patients’ adaptations to them, and the physician can advocate for change at the community level. Food insecurity may contribute to the inverse relation of obesity prevalence with socioeconomic status, but the relationship is a complex one.<sup>63</sup> Other barriers low-income families may face are lack of safe places for physical activity and lack of consistent access to healthful food choices, particularly fruits and vegetables. Low cognitive stimulation in the home, low socioeconomic status, and maternal obesity all predict development of obesity.<sup>64</sup> In research settings, there is accumulating evidence for the detrimental effects of overcontrolling parental behavior on children’s ability to self-regulate energy intake. For example, maternal-child feeding practices, maternal perception of daughter’s risk of overweight,<sup>65</sup> maternal restraint, verbal prompting to eat at mealtime, attentiveness to noneating behavior, and close parental monitoring<sup>66</sup> all may promote undesired

consequences for children's eating behaviors. Parental food choices influence child food preferences,<sup>67</sup> and degree of parental adiposity is a marker for children's fat preferences.<sup>68</sup> Children and adolescents of lower socioeconomic status have been reported to be less likely to eat fruits and vegetables and to have a higher intake of total and saturated fat.<sup>69-71</sup> Absence of family meals is associated with lower fruit and vegetable consumption as well as consumption of more fried food and carbonated beverages. Although our understanding of the development of eating behaviors is improving, there are not yet good trials to demonstrate effective translation of this knowledge base into clinical practices to prevent obesity. At a minimum, however, pediatricians need to proactively discuss and promote healthy eating behaviors for children at an early age and empower parents to promote children's ability to self-regulate energy intake while providing appropriate structure and boundaries around eating.

Widespread and profound societal changes during the last several decades have affected child rearing, which in turn has affected childhood patterns of physical activity as well as diet. National survey data indicate that children are currently less active than they have been in previous surveys. Leisure activity is increasingly sedentary, with wide availability of entertainment such as television, videos, and computer games. In addition, with increasing urbanization, there has been a decrease in frequency and duration of physical activities of daily living for children, such as walking to school and doing household chores. Changes in availability and requirements of school physical education programs have also generally decreased children's routine physical activity, with the possible exception of children specifically enrolled in athletic programs. All these factors play a potential part in the epidemic of overweight.<sup>72</sup>

National survey data indicate that 20% of US children 8 to 16 years of age reported 2 or fewer bouts of vigorous physical activity per week, and more than 25% watched at least 4 hours of television per day.<sup>73</sup> Children who watched 4 or more hours of television per day had significantly greater BMI, compared with those watching fewer than 2 hours per day.<sup>73</sup> Furthermore, having a television in the bedroom has been reported to be a strong predictor of being overweight, even in preschool-aged children.<sup>74</sup> Some cross-sectional data have found significant correlation between obesity prevalence and television viewing,<sup>75-77</sup> but others have not.<sup>78,79</sup> The results of a randomized trial to decrease television viewing for school-aged children has provided the strongest evidence to support the role of limiting television in prevention of obesity. In this study, decreasing "media use" without specifically promoting more active behaviors in the intervention group resulted in a significantly lower increase in BMI at the 1-year follow-up, compared with the control group.<sup>80</sup> Additional support for the importance of decreasing television viewing comes from controlled investigations that demonstrated that obese children who were reinforced for decreasing sedentary activity (and following an energy-restricted diet) had significantly

greater weight loss than those who were reinforced for increasing physical activity.<sup>42</sup> These findings have important implications for anticipatory guidance and provide additional support for recommendations to limit television exposure for young children.<sup>2</sup>

### EARLY RECOGNITION

Routine assessments of eating and activity patterns in children and recognition of excessive weight gain relative to linear growth are essential throughout childhood. At any age, an excessive rate of weight gain relative to linear growth should be recognized, and underlying predisposing factors should be addressed with parents and other caregivers. The Centers for Disease Control and Prevention percentile grids for BMI are important tools for anticipatory guidance and discussion of longitudinal tracking of a child's BMI. Significant changes on growth patterns (eg, upward crossing of weight for age or BMI percentiles) can be recognized and addressed before children are severely overweight.<sup>81</sup> An increase in BMI percentiles should be discussed with parents, some of whom may be overly concerned and some of whom may not recognize or accept potential risk.<sup>82</sup>

Although data are extremely limited, it is likely that anticipatory guidance or treatment intervention before obesity has become severe will be more successful. Discussions to raise parental awareness should be conducted in a nonjudgmental, blame-free manner so that unintended negative impact on the child's self-concept is avoided.<sup>24</sup> Data from adult patient surveys indicate that those who were asked by their physician about diet were more likely to report positive changes.<sup>83</sup> Similarly, the efficacy of physicians discussing physical activity,<sup>84</sup> breastfeeding,<sup>85</sup> and smoking prevention<sup>86</sup> is well documented. Thus, pediatricians are strongly encouraged to incorporate assessment and anticipatory guidance about diet, weight, and physical activity into routine clinical practice, being careful to discuss habits rather than focusing on habitus to avoid stigmatizing the child, adolescent, or family.

### ADVOCACY

Abundant opportunities exist for pediatricians to take a leadership role in this critical area of child health, including action in the following areas: opportunities for physical activity, the food supply, research, and third-party reimbursement. Change is desperately needed in opportunities for physical activity in child care centers, schools, after-school programs, and other community settings. As leaders in their communities, pediatricians can be effective advocates for health- and fitness-promoting programs and policies. Foods that are nutrient rich and palatable yet low in excess energy from added sugars and fat need to be readily available to parents, school and child care food services, and others responsible for feeding children. Potential affordable sources include community gardens and farmers' market projects. Advertising and promotion of energy-dense, nutrient-poor food products to children may need to be regulated or curtailed. The increase in

carbonated beverage intake has been linked to obesity<sup>87</sup>; therefore, the sale of such beverages should not be promoted at school. Pediatricians are encouraged to work with school administrators and others in the community on ways to decrease the availability of foods and beverages with little nutritional value and to decrease the dependence on vending machines, snack bars, and school stores for school revenue. Regarding physical activity, advocacy is sorely needed for physical education programs that emphasize and model learning of daily activities for personal fitness (as opposed to physical education limited to a few team sports).

New initiatives for pilot projects to test prevention strategies have been funded by the National Institutes of Health and other organizations, but a long-term commitment of substantial funds from many sources and to many disciplines will be needed to attack this serious, widespread, and potentially intractable problem. Support for development and testing of primary prevention strategies for the primary care setting will be critical. Likewise, investment of substantial resources will be required for development of effective treatment approaches for normalizing or improving body weight and fitness and for determining long-term effects of weight loss on comorbidities of childhood obesity. Collaboration and coalitions with nutrition, behavioral health, physical therapy, and exercise physiology professionals will be needed. Working with communities and schools to develop needed counseling services, physical activity opportunities, and strategies to reinforce the gains made in clinical management is also important.

Pediatric referral centers will need to develop specialized programs for treatment of complex and difficult cases, and for research into etiology and new methods of prevention and treatment. Efforts are needed to ensure adequate health care coverage for preventive and treatment services. Even when serious comorbidities are documented, insurance reimbursement is limited.<sup>88</sup> Lack of reimbursement is a disincentive for physicians to develop prevention and treatment programs and presents a significant barrier to families seeking professional care.

#### SUMMARY/CONCLUSIONS

1. Prevalence of overweight and its significant comorbidities in pediatric populations has rapidly increased and reached epidemic proportions.
  2. Prevention of overweight is critical, because long-term outcome data for successful treatment approaches are limited.
  3. Genetic, environmental, or combinations of risk factors predisposing children to obesity can and should be identified.
  4. Early recognition of excessive weight gain relative to linear growth should become routine in pediatric ambulatory care settings. BMI ( $\text{kg}/\text{m}^2$  [see <http://www.cdc.gov/growthcharts>]) should be calculated and plotted periodically.
  5. Families should be educated and empowered through anticipatory guidance to recognize the impact they have on their children's development of lifelong habits of physical activity and nutritious eating.
6. Dietary practices should be fostered that encourage moderation rather than overconsumption, emphasizing healthful choices rather than restrictive eating patterns.
  7. Regular physical activity should be consciously promoted, prioritized, and protected within families, schools, and communities.
  8. Optimal approaches to prevention need to combine dietary and physical activity interventions.
  9. Advocacy is needed in the areas of physical activity and food policy for children; research into pathophysiology, risk factors, and early recognition and management of overweight and obesity; and improved insurance coverage and third-party reimbursement for obesity care.

#### RECOMMENDATIONS

1. Health supervision
  - a. Identify and track patients at risk by virtue of family history, birth weight, or socioeconomic, ethnic, cultural, or environmental factors.
  - b. Calculate and plot BMI once a year in all children and adolescents.
  - c. Use change in BMI to identify rate of excessive weight gain relative to linear growth.
  - d. Encourage, support, and protect breastfeeding.
  - e. Encourage parents and caregivers to promote healthy eating patterns by offering nutritious snacks, such as vegetables and fruits, low-fat dairy foods, and whole grains; encouraging children's autonomy in self-regulation of food intake and setting appropriate limits on choices; and modeling healthy food choices.
  - f. Routinely promote physical activity, including unstructured play at home, in school, in child care settings, and throughout the community.
  - g. Recommend limitation of television and video time to a maximum of 2 hours per day.
  - h. Recognize and monitor changes in obesity-associated risk factors for adult chronic disease, such as hypertension, dyslipidemia, hyperinsulinemia, impaired glucose tolerance, and symptoms of obstructive sleep apnea syndrome.
2. Advocacy
  - a. Help parents, teachers, coaches, and others who influence youth to discuss health habits, not body habitus, as part of their efforts to control overweight and obesity.
  - b. Enlist policy makers from local, state, and national organizations and schools to support a healthful lifestyle for all children, including proper diet and adequate opportunity for regular physical activity.
  - c. Encourage organizations that are responsible for health care and health care financing to provide coverage for effective obesity prevention and treatment strategies.
  - d. Encourage public and private sources to direct funding toward research into effective strategies to prevent overweight and obesity and to maximize limited family and community re-

sources to achieve healthful outcomes for youth.

- e. Support and advocate for social marketing intended to promote healthful food choices and increased physical activity.

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Pamela Kanda, MPH

\*Lead authors

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Weight-control Information Network Web site. Available at: <http://www.niddk.nih.gov/health/nutrit/win.htm>

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