



Promoting Healthy Weight

Theme **4**

INTRODUCTION

Healthy weight, because of its importance to childhood and future adult health, its interrelationships with lifestyle, behavior, the environment, and family life, and the growing prevalence of overweight and obesity, has been identified as 1 of 2 themes with special significance. Recommendations for screening, assessing, and managing healthy weight and the prevention of overweight and obesity are highlighted throughout this book.

A child's weight status is the result of a number of factors (genes, metabolism, height, behavior, and environment) working together. Two of the most important determinants are nutrition and physical activity. A balanced and nutritious diet and regular physical activity are key factors to promoting a healthy weight during childhood and throughout life. This is also true for children and youth with special health care needs who may have additional nutrition

and physical activity demands specific to their condition. Therefore, readers are encouraged to review this theme, which focuses on assessing, managing, and preventing overweight and obesity, in concert with the Promoting Healthy Nutrition and Promoting Physical Activity themes.

Defining Pediatric Overweight and Obesity

An overweight child or adolescent has accrued weight beyond the healthy level for his or her age and height. Obesity represents an even greater increase of overweight. The overweight child is at risk for obesity in adolescence. Obesity places children and adolescents at risk for adverse health effects.¹

Overweight and obesity in children and adolescents are defined by body mass index (BMI), which equals weight in kilograms divided by height in meters squared. (In the English system, BMI equals weight in pounds divided by height in inches squared, multiplied by 703.) Because children's body fatness changes as they grow, and boys and girls differ in body fatness as they mature, BMI for



children, also referred to as BMI-for-age, is determined by comparing weight and height against age- and gender-specific growth charts. BMI for children and youth with special health care needs is calculated in the same manner. Table 1 provides percentiles for interpreting BMI for normal weight, overweight, and obesity in children.^{2,3}

TABLE 1

Percentiles for Assessing Overweight and Obesity

Percentile	Status
<85th	Normal, or healthy, weight
≥85th but <95th	Overweight
≥95th	Obese

Prevalence and Trends of Overweight and Obesity in Children

Childhood obesity is the most prevalent pediatric nutritional problem in the United States. It occurs in all parts of the country and affects all income, racial, and ethnic groups. The nutrition and physical activity choices that lead to obesity are influenced by many factors, including lack of access to nutritious foods, individual lifestyle choices, food advertising, and a prevailing culture that promotes overeating and sedentary lifestyles. It affects as many as 15% to 30% of grade-school children and adolescents. The percentage of

overweight children aged 6 to 11 years has almost quadrupled from 4% in 1970 to 19% in 2004.⁴ The prevalence of overweight varies among different ethnic groups. African American, Hispanic/Latino, and American Indian children and adolescents have particularly high overweight rates.^{5,6} Children also are becoming overweight at increasingly young ages. This is of concern because obesity that occurs early in life and persists throughout childhood is more difficult to treat than obesity that develops later in life. Moreover, a child who continues to be obese into adolescence is at increased risk of developing related health problems. A school-aged child who is at risk of being overweight has an increased probability of becoming an obese adolescent and adult. Obese adolescents are unlikely to attain normal adult weight.

National Health and Nutrition Examination Survey (NHANES) data show a continuing rise in overweight status among children and youth. The increase in overweight from NHANES (1988-1994) to NHANES (1999-2000) has been significant (Table 2). African American and Mexican American children are disproportionately affected by this problem. For example, among 6- to 11-year-olds, 22% of African American children and 22.5% of Mexican American children are classified as overweight compared to 17.7% non-Hispanic white children.

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TABLE 2

Obesity Statistics for Children (Body Mass Index ≥95th Percentile)

Age (years)	NHANES 1988-1994 (%)	NHANES 1999-2000 (%)	NHANES 2003-2004 (%)
2-5	7.2	10.4	13.9
6-11	11.3	15.3	18.8

NHANES, National Health and Nutrition Examination Survey. Data from Ogden CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and trends in overweight among US children and adolescents, 1999-2000. *JAMA*. 2002;288:1728-1732⁵; Hedley AA, Ogden, CL, Johnson, CL, Carroll, MD, Curtin, LR, Flegal, KM. Overweight and obesity among US children, adolescents, and adults, 1999-2002. *JAMA*. 2004;291:2847-2850.⁷ Ogden CC, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *JAMA*. 2006;295:1549-1555.⁸

Children and youth with special health care needs share similar risk for overweight conditions. The risk of obesity in US Special Olympics athletes, both in children and adults, is similar to that of the general population. United States Special Olympians are 3.1 times more likely to be obese than non-US participants in the Special Olympics.⁹

Obesity is associated with significant health problems in children and adolescents and is an important early risk factor for much adult morbidity and mortality. Medical problems that are common in obese children and adolescents can affect cardiovascular health (eg, hypercholesterolemia, dyslipidemia, and hypertension), the pulmonary system (eg, asthma and obstructive sleep apnea), the endocrine system (eg, hyperinsulinism, insulin resistance, impaired glucose tolerance, type 2 diabetes mellitus, and menstrual irregularity), the musculoskeletal system (eg, osteoarthritis), and mental health (eg, depression and low self-esteem).

Screening for, and Assessing, Overweight and Obesity

Infants, children, and adolescents should be considered at high risk of overweight or obesity if any of the following conditions apply:

- One or both parents are obese.
- One or more siblings are obese.
- They are from families with low incomes.
- They have a chronic disease or disability that limits mobility.

The first step in screening for weight problems is determining and interpreting a child's BMI-for-age. If he is overweight or obese, a comprehensive physical assessment is then critical to determine the appropriate interventions. Assessment also should determine whether the child's weight status is accompanied by any other disorder and whether the child has any physical limitations that will require modifications to an exercise program to make it suited to the child.²

A critical component of this review is the health care professional's sensitivity to cultural differences that exist in perceptions about healthy weight and body image. Scientific findings about healthy weights may not coincide with family and community beliefs about health and beauty. Discussion about family cultural perspectives is a key piece of assessing obesity in children. In addition, the motivation to make the changes needed to achieve and maintain a healthy weight may come from a variety of sources other than scientific evidence. Partnering with respected community leaders, such as elders or clergy, can encourage behavior change. Techniques for assessing and treating obesity are the same across all cultures. What differs is the way in which these actions can be approached and carried out. Culturally relevant messages can be potent for families.

If a child is overweight or obese, health care professionals also must be sensitive to the possibility that the family may be experiencing food insecurity. Food insecurity for a family means limited or uncertain availability of nutritionally adequate and safe foods, or uncertain ability to acquire appropriate foods in socially acceptable ways. Twelve percent of American households were food insecure for at least part of 2004.¹⁰ The prevalence of food insecurity has increased steadily since 1998.¹¹ Food insecurity forces people to buy and consume less-expensive foods, which are often less nutrient dense but more calorically dense and higher in fat than more expensive foods. Overconsumption of nonnutritious foods is recognized as a factor in the etiology of obesity in disadvantaged populations.¹² (For more information on this topic, see the Promoting Healthy Nutrition theme.)

Children older than 2 years who are between the 85th and 95th percentile of BMI need a second-level assessment and screening for the following 5 items:

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- **Family history.** Does the history include early cardiovascular disease, parental hypercholesterolemia, parental obesity, or a first- or second-generation relative with type 2 diabetes, or is the family history of these conditions unknown?
- **Blood pressure.** What is the child’s or adolescent’s blood pressure, based on age, gender, and height? Sustained blood pressures above the 90th percentile for age, gender, and height are considered prehypertensive, and blood pressure above the 95th percentile for age, gender, and height is considered high.
- **Fasting Lipid Profile.** Is fasting blood cholesterol level 200 mg/dL or higher? Is HDL cholesterol reduced? Are triglycerides elevated?

Body Mass Index Rebound

After about 1 year of age, BMI-for-age begins to decline and continues falling during the preschool years. After it reaches a minimum at approximately 4 to 6 years of age, BMI-for-age begins a gradual increase through adolescence.

The increase in BMI that occurs after it reaches its lowest point is referred to as BMI rebound. This change is a normal pattern of growth in all children. The age when the BMI rebound occurs may be a critical period in childhood for the development of obesity as an adult. An early BMI rebound, occurring before 4 to 6 years of age, is associated with obesity in adulthood. Additional research is needed to further understand the impact of early BMI rebound on adult obesity.

Metabolic Syndrome

Metabolic syndrome is not a disease itself, but is characterized as a cluster of related diseases that has been well described in adults and is associated with increased health risks, including cardiovascular disease. Currently, no acceptable definition of the metabolic syndrome exists for children and adolescents. A 2004 study¹³ in children and adolescents proposed that children having 3 or more of the criteria shown in Table 3 be defined as having metabolic syndrome. Being overweight leads to insulin resistance and hypertension, dyslipidemia, type 2 diabetes, and other metabolic abnormalities. The prevalence of metabolic syndrome increases as BMI climbs above the 95th percentile.

Results of this study suggest that metabolic syndrome is more common among children and adolescents than previously reported and that its prevalence increases directly with the degree of obesity.¹³ Increasingly, data demonstrate that childhood obesity is “significantly associated with insulin resistance, dyslipidemia, and elevated blood pressure in young adulthood.”¹⁴ Thus, risk factors and pre-disease conditions (eg, insulin resistance

TABLE 3

Criteria for Metabolic Syndrome in Children and Adolescents

Measures	Criteria
BMI	>97th percentile
Triglycerides	>110 mg/dL
High-density lipoprotein cholesterol	<40 mg/dL
Systolic/diastolic blood pressure	>90th percentile for age, gender, and height
Impaired glucose tolerance	>110 mg/dL FBG >140 mg/dL OGTT
Waist circumference	
Boys	>90th percentile
Girls	≥90th percentile

FBG, Fasting blood glucose; OGTT, oral glucose tolerance test.

- **Large change in BMI.** Has there been an increase of more than 2 to 3 points in BMI-for-age in 1 year?
- **Concern about weight.** Has the child or family expressed concerns over the child’s or adolescent’s weight?

If any one of these factors is present, the child should receive, or be referred for, an in-depth medical assessment and intervention to reduce weight and improve overall health.

and shortness of breath) must be identified and treated as early and as effectively as possible.

NHANES (1988-1994) data showed a 6.8% prevalence of the characteristics that define metabolic syndrome among overweight adolescents in the 85th to 94th percentiles for weight and 28.7% among obese adolescents who are in the 95th or greater percentiles for weight.¹⁵ These rates may underestimate the current extent of the problem, because the magnitude and prevalence of childhood obesity have increased in the past decade.

Treating Overweight and Obesity

The development and persistence of overweight and obesity is based on a wide variety of factors, including age, gender, family history, developmental stage, ethnicity, and social environment. Each factor influences the treatment goal, the selection of the type of treatment, and the course of therapy. Obesity is a complex condition and, even with strict adherence to treatment recommendations, progress with weight loss can be slow. Because treatment requires a time commitment, recommended interventions must recognize family lifestyle patterns and the child's social environment.

The primary goals of treatment should relate to changing eating and physical activity habits and resolving any comorbid conditions. Interventions should be focused on encouraging dietary changes, increasing physical activity, and modifying behaviors, rather than weight loss alone. Box 1 presents the goals for intervention.

Preventing Overweight and Obesity

Because intervention programs are few, and program costs are high, the most successful intervention for promoting a healthy weight is prevention. Strategies that encourage healthy eating behaviors, regular physical activity, and reduced sedentary behaviors (eg, watching television, videotapes, or DVDs, or using the computer) are essential to helping children and adolescents achieve and maintain a healthy weight. The need for well-designed studies that examine a range of interventions remains a priority.² Features of

BOX 1 Intervention Goals

Children 2 to 18 years of age

- BMI 85th to 94th percentile: GOAL = Weight maintenance, resulting in decreasing BMI as age increases
- BMI \geq 95th percentile with no comorbidity: GOAL = Weight maintenance, resulting in decreasing BMI as age increases
- BMI \geq 95th percentile with comorbid conditions or severely obese: GOAL = Gradual weight loss that should not exceed 1 pound per month in children 2 to 11 years of age or 2 pounds per week in older obese children and adolescents

Source: The Expert Committee Recommendations on the assessment, prevention, and treatment of child and adolescent overweight and obesity. Supplement to *Pediatrics*. In press.¹

prevention programs with successful outcomes include:

- Targeting both parents and children for behavior change
- Emphasizing the role of parents as a way to influence young children's behaviors
- Using behavior modification and education, rather than focusing on education alone
- Increasing physical activity, which is essential to long-term maintenance of weight control in children
- Reducing sedentary activities, which achieves better long-term physical activity levels than increasing structured physical activity
- Maintaining the treatment program over a long period of time

Successful outcomes also depend on action and guidance by everyone involved with a child or adolescent, from parents to health care professionals to the school and the community. Some helpful actions are listed in Box 2.

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BOX 2**Actions to Reduce Overweight and Obesity in Children and Adolescents****For the health care professional**

- Plot BMI routinely for early recognition of overweight and obesity.
- Address increasing BMI percentile before it reaches 95% or higher.
- Identify “at risk” children.
 - Children whose parents are obese
 - Children with a sibling who is obese
 - Children from families with low income
 - Children with a chronic disease or disability that limits mobility
- Provide anticipatory guidance for nutrition and physical activity.

For the parents

- Act as a role model for nutrition and physical activity.
- “Special times” do not have to involve food or sedentary activities.
- Use things other than food or TV time as rewards.
- Promote physically active family time (eg, hikes, bike rides, and playing outside).
- Eat together as a family.
- Limit screen time (ie, TV, computer, and video games) to 1 to 2 hours per day.¹⁶
- Do not allow a TV in the child’s bedroom.¹⁷
- Turn the TV off during mealtimes.
- Limit dining out.
- Promote water and low-fat milk consumption over juice and soda.

For schools

- Integrate nutrition and physical activity education into the school curriculum.
- Promote physical activity.
- Encourage children to walk or bike to school where it is safe to do so.
- Provide nutritious meals.
- Have recess before lunch.
- Control vending machines and encourage the sale of healthy foods in vending machines.

For the community

- Provide safe playgrounds and safe neighborhoods for bike riding, walking, and other physical activity.
- Promote physical activity outside of school.
- Identify and deliver culturally relevant messages about healthy eating and weight.

For reimbursement and legislation (insurance and policy)

- Acknowledge obesity as a medical condition so that health care professionals can be reimbursed for services.
- Provide reimbursement to health care professionals for anticipatory guidance about nutrition and physical activity.

Sources

American Academy of Pediatrics, Committee on Nutrition. Prevention of pediatric overweight and obesity. *Pediatrics*. 2003;112:424-430.²

American Academy of Pediatrics, Council on Sports Medicine and Fitness and Council on School Health. Active healthy living: prevention of childhood obesity through increased physical activity. *Pediatrics*. 2006;117:1834-1842.¹⁸

Screen Time

Although few data have been compiled on media use and its relationship to weight gain in the early childhood years, some literature describes the relationship of screen watching and weight gain for children in the middle childhood and adolescent years.¹⁹ Children who watch 5 or more hours of TV per day were 4.6 times more likely to be overweight or obese compared with those watching 0 to 2 hours per day.²⁰ All media viewing, including time spent in front of a computer screen in later childhood and adolescence, correlates with weight gain.^{16,21,22} This physical inactivity should be taken into consideration in determining the total media time allowed.

Concerns about screen time and obesity generally focus on 2 issues. The first is that television watching and other screen time is a sedentary activity. Obesity prevention efforts increasingly recommend that children and adolescents reduce time spent in sedentary activities as well as increase time spent in physical activity. The second concern is the effect on eating behaviors, both because children may eat while watching television or using the computer and because food advertisements and cross-promotions on television may encourage children to buy (or influence their parents to buy) and eat foods that are high in calories, fat, and sugar, and low in nutrients. One study has shown an association between increased television viewing among children and adolescents and behaviors such as increased consumption of high-fat foods.²³ A recent analysis of advertising and obesity provides an additional perspective by suggesting that, although advertising may prompt a new behavior, its main power is to maintain and reinforce existing behaviors. By supporting unhealthy nutrition behaviors (eg, snacking on high-fat, high-calorie foods), advertising reduces individuals' ability to recognize the behaviors as detrimental to their health or their desire to change the behavior.²⁴

Promoting a Healthy Weight: Infancy— Birth to 11 Months

Multiple and additive risk factors are associated with childhood overweight and obesity. Intrauterine exposure, genetic makeup, and biologic, psychological, sociocultural, and environmental factors combine to influence a child's weight. Parental obesity and maternal gestational diabetes consistently predict childhood overweight.

BMI cannot be calculated from birth to 23 months of age because length is measured instead of height. Weight-for-length is an important alternative recording of infant growth.

Exclusive breastfeeding, and avoidance of overfeeding if parents bottle feed their infants, is recommended to ensure adequate growth that is not excessive. Solid foods are not introduced until 4 to 6 months of age and should be presented as both complementary foods and calorie replacement. The young infant should have multiple opportunities for supervised back and tummy time while awake, and exploration of her environment is encouraged as an age-appropriate physical activity.

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Promoting a Healthy Weight: Early Childhood—1 to 4 Years

Given the large number of significant health problems that are associated with obesity in children as age increases, the American Academy of Pediatrics (AAP) Committee on Nutrition recommends early recognition by monitoring the BMI of every child older than 2 years.²⁵

Addressing rapid weight gain involves helping families initiate lifestyle changes (Box 3). The probability of an overweight 4-year-old child becoming an obese adult is about 20%. Some parents do not recognize (or accept) that their child may be gaining weight too rapidly, is overweight, or is unlikely to outgrow the overweight.

In some cultures, a large child is considered a healthy child. If families do not believe that a child is overweight, they probably will not consider changing current behaviors.

Moreover, if mothers are dieting or restricting their food intake and limiting their children's access to food, the outcome is a diminished ability for the child to self-regulate food intake as well as an increased desire for the restricted foods. Interestingly, both situations can result in excessive weight gain. Many health care professionals counsel mothers to restrict food access to children, particularly young girls, in an attempt to slow weight gain. Such advice must be given judiciously so as not to hamper the child's ability to self-regulate.²⁵

Early childhood is the time when a family begins to imprint its habits on a child. This is a period of opportunity for families to establish healthful eating habits and activity patterns for both children and parents. Providing and role modeling a healthy and nutritious diet, regular physical activity, and limited sedentary time is recommended. The AAP recommends no television viewing for children younger than 2 years, and no more than 1 to 2 hours per day for older children.¹⁶ Most pediatric health care professionals

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BOX 3

A Health-Centered Approach

In its *Guidelines for Childhood Obesity Prevention Programs*, the Society for Nutrition Education notes that it is best to apply “a health-centered, rather than weight-centered, approach that focuses on the whole child, physically, mentally, and socially.”

The *Guidelines* explains further by saying, “The emphasis is on living actively, eating in normal and healthy ways, and creating a nurturing environment that helps children recognize their own worth and respect cultural foodways and family traditions. It is recognized that overweight, eating disorders, hazardous weight loss, nutrient deficiencies, size discrimination, and body hatred are all interrelated and need to be addressed in comprehensive ways that do no harm.”

Source: Society for Nutrition Education, Weight Realities Division. *Guidelines for Childhood Obesity Prevention Programs: Promoting Healthy Weight in Children*. *J Nutr Educ Behav*. 2003;35:1-4.²⁶

include videos, computers, and TV when calculating viewing time. This “screen time” is inevitably a time of physical inactivity. Because a majority of young children spend part or all of their day in out-of-home child care programs, parents and health care professionals should factor in their nutrition intake and physical activities in these settings.

Promoting a Healthy Weight: Middle Childhood—5 to 10 Years

Family habits that have been established for younger children can be continued and

modified in the middle childhood years. Parents remain powerful role models in providing a healthy lifestyle for the family regarding food and activity. Television and other media must now be actively limited by parents and other caregivers.²⁷

Out-of-home influences are becoming more important as school routine, and the behavior of peers may challenge or enrich the child's and family's habits. Media have a strong influence on food choice, and community decisions regarding school meals, food and drink vending machine policies, and physical education activities affect the child's eating and playing environment. Likewise, community resources for safe play spaces have a direct impact on obesity risk. (See Box 2.)

Promoting a Healthy Weight: Adolescence—11 to 21 Years

As with the earlier age groups, obesity during adolescence affects blood pressure, blood lipids, lipoprotein, and insulin levels. Perhaps the most widespread consequence of overweight and obesity is psychological, resulting from discrimination.²⁸

The percentage of adolescents who are overweight or obese has increased considerably over the past 25 years, according to NHANES.⁴ During the 1976 to 1980 survey period, 5% of adolescents aged 12 to 19 years were obese, a figure that increased to 11% during the 1988 to 1994 survey period, and to 17% during the 2003 to 2004 period.

Thus, more than 3 times as many adolescents are obese today than in 1980.⁴

Most obese adolescents have at least one additional risk factor for cardiovascular disease, such as elevated blood pressure, hyperlipidemia, or hyperinsulinemia. Adolescents who are overweight or obese are more likely to be so as adults,^{29,30} and adolescent obesity has been linked to higher mortality from all causes in adulthood.³¹ Racial and ethnic disparities also can be noted from obesity data.

People from various cultures may view body weight in different ways. Keeping an adolescent from being underweight may be very important to people from cultures in which poverty or insufficient food supplies are common. Families may view excess weight as healthy and may be offended if a health care professional refers to their adolescent as overweight or obese.

To reduce the risk of obesity, all foods and beverages sold or served to students in schools should meet an accepted nutritional content standard (eg, *Dietary Guidelines for Americans*³²). However, many popular foods (foods and beverages that are not part of the federal school meal programs) that are served or sold in school cafeterias, vending machines, and school stores, and at school fundraisers are high in calories and low in nutritional value.

In addition, schools should ensure that all adolescents participate in 60 minutes of moderate to vigorous physical activity during the school day. Opportunities for physical activity through the school should be expanded, including intramural and interscholastic sports programs and other physical activity clubs, programs, and lessons.³³

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