Diet, Nutrition, and Weight Issues among Children and Adolescents

One of the most disturbing observations about overweight and obesity in the United States is the epidemic of supersized kids. Inge Lissau et al. find in “Body Mass Index and Overweight in Adolescents in Thirteen European Countries, Israel, and the United States” (Archives of Pediatrics and Adolescent Medicine, vol. 158, no. 1, January 2004) that the United States, followed by Greece and Portugal, had the highest percentage of overweight teens. In 2007 many more American children and adolescents were seriously overweight than were overweight just thirty years ago. The most accurate data about the prevalence of overweight among children and adolescents come from the Centers for Disease Control and Prevention’s (CDC) 2003–04 National Health and Nutrition Examination Survey (NHANES), which finds that the percentage of overweight children aged six to eleven more than quadrupled (from 4% to 18.8%) and the percentage of teens aged twelve to nineteen nearly tripled (from 6.1% to 17.4%) between 1971–74 and 2003–04. (See Figure:)

With children and teens as well as adults, body mass index (BMI) is used to determine underweight, overweight, and at risk for overweight. Children’s body fatness changes over the years as they grow, and girls and boys differ in their body fatness as they mature. In light of these differences, the BMI for children (also referred to as BMI-for-age) is gender and age specific. For example, Figure:
shows BMI percentiles for boys aged two to twenty and demonstrates how different BMI numbers are interpreted for a ten-year-old boy. Figure:
shows that children of different ages (and genders) may have the same BMI number, but that number will fall in a different percentile for each child, classifying the ten-year-old boy as overweight and the fifteen-year-old as at a healthy weight.

Overweight is defined as at or above the age- and gender-specific ninety-fifth percentile on the BMI. Still, even children at the eighty-fifth percentile are considered at risk for overweight- and obesity-induced illness and overweight throughout their adult lives. (See Table:
Overweight children are much more likely to become overweight adults—William H Dietz indicates in “‘Adiposity Rebound’: Reality or Epiphenomenon?” (The Lancet, vol. 356, 2000) that an estimated 30% of adult obesity begins in childhood—unless they adopt and maintain healthier patterns of eating and exercise. The prevalence of overweight among adolescents is of particular concern because overweight adolescents are at even greater risk than overweight children of becoming overweight adults.

Like adults, children and adolescents are eating more than ever and exercising less. Even though the link between obesity and disease in adolescence is weaker than it is for obese adults, teens who are overweight are at a high risk of health problems later in life. Furthermore, in “Even Children Have Heart Disease—Especially Those Who Are Overweight” (Medscape Cardiology, vol. 8, no. 1, 2004), Victoria Porter explains that 50% to 80% of obese teens become obese adults. Type 2 diabetes, high blood lipid levels, and hypertension (high blood pressure) occur with increased frequency among overweight youth. Overweight children and teens are also at risk for psychosocial problems ranging from teasing and ostracism to social isolation and discrimination.

Prevalence of Overweight Teens by Race and Ethnicity

The 2003–04 NHANES finds that nearly one-fifth of white, Mexican-American, and non-Hispanic African-American male teens, aged twelve to nineteen, were overweight. (See Figure:)

Weight status categories by BMI-for-age percentiles

<table>
<thead>
<tr>
<th>Weight status category</th>
<th>Percentile range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>Less than the 5th percentile</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>5th percentile to less than the 85th percentile</td>
</tr>
<tr>
<td>At risk of overweight</td>
<td>85th to less than the 95th percentile</td>
</tr>
<tr>
<td>Overweight</td>
<td>Equal to or greater than the 95th percentile</td>
</tr>
</tbody>
</table>

The largest increase in the prevalence of overweight was among non-Hispanic white (from 11.6% in 1988–94 to 19.1% in 2003–04) and African-American (from 10.7% to 18.5%) teens, compared to a smaller increase among Mexican-American (from 14.1% to 18.3%) teens.

From 1988–94 to 2003–04 non-Hispanic African-American (from 13.2% to 25.4%) teenaged girls, aged twelve to nineteen, experienced the largest increase in the prevalence of overweight, compared to non-Hispanic white (from 7.4% to 15.4%) and Mexican-American (from 9.2% to 14.1%) teens. (See Figure:...
The 2003–04 NHANES finding of increasing percentages of overweight teens suggests the likelihood of yet another generation of overweight adults who may be at risk for subsequent overweight and obesity-related health problems.

Why Are So Many Children and Teens Overweight?

Most children are overweight for the same reason as their adult counterparts: they consume more calories than they expend. Infants and toddlers appear to be effective regulators of caloric consumption, taking in only the calories needed for growth and development. By the time children are school age, this self-regulatory mechanism has weakened and when offered larger portions, they will eat them.

Heredity and environment play key roles in determining a child’s risk of becoming overweight or obese. The American Academy of Child and Adolescent Psychiatry notes in “Obesity in Children and Teens” (January 2001, http://www.aacap.org/cs/root/facts_for_families/obesity_in_children_and_teens) that if one parent is obese, then there is a 50% chance that a child will be obese, and when both parents are obese, a child has
an 80% chance of being obese. Even though there is mounting evidence of genetic predisposition and susceptibility to overweight and obesity, childhood obesity is still considered largely an environmental problem—the result of behaviors, attitudes, and preferences learned early in life. Children's relationships with food develop in response to family and cultural values and practices as well as the influences of school, peers, and the media.

The question remains: Which environmental factors have given rise to the increasing prevalence of overweight children and teens during the past three decades? Many observers point to reliance on fat-laden convenience and fast foods, along with time spent watching television, playing videogames, and surfing the Internet, instead of being outdoors and getting physical activity. The CDC reports in Physical Activity and Good Nutrition: Essential Elements to Prevent Chronic Diseases and Obesity, 2007 (April 2007, http://www.cdc.gov/nccdphp/publications/aag/pdf/dnpa.pdf) that about two-thirds of high school students do not get the recommended levels of physical activity, with daily participation in physical education classes falling from 42% in 1991 to 33% in 2005. Television viewing, media advertising, dwindling school physical education programs, neighborhoods where it is unsafe for children to play outdoors, and even working mothers have been implicated.

Working parents have been accused of a variety of nutritional and parenting infractions that have contributed to children's overindulgence in unhealthy foods. First, they leave children unsupervised and unable to satisfy their hunger with anything except cookies, chips, and soda. Some observers speculate that these children are starved emotionally—for time and attention—as well as nutritionally. They may also be hungry for information, because even though many adolescents are responsible for choosing and preparing their own food, they are often unprepared to make healthy choices.

Eating alone, in front of a television or computer, kids are more likely to overeat because they are lonely, bored, or susceptible to advertising cues. Overcome with guilt because they are not home to prepare meals, some working parents may intensify the problem by indulging their children with too many food treats. Stay-at-home parents do not necessarily convey healthier attitudes about food, eating, and nutrition than parents who work outside the home. Both groups may use food, especially sweets, to reward good behavior or may pressure children to clean their plates. Though these suppositions remain unproven, it is known that parents with eating disorders, obsessive dieters, and those with unhealthy eating habits are powerful, negative role models for children.

Results from the Youth Risk Behavior Surveillance

The “Youth Risk Behavior Surveillance System—United States, 2005” (Morbidity and Mortality Weekly Report, vol. 55, no. SS-5, June 9, 2006) is a national school-based survey conducted by the CDC. It examines health-risk behaviors among youth and young adults, including unhealthy dietary behaviors, physical inactivity, and overweight. This section summarizes key findings from the national survey of students in grades nine through twelve conducted in 2005.
shows that overweight is increasing among American youth. In 2003 just three states reported more that 15% to 19% of high school students were overweight (greater than or equal to the ninety-fifth percentile for BMI); by 2005 there were twice as many states with this percentage of overweight teens. Similarly, just four states reported that less than 10% of teens were overweight in 2005, compared to six in 2003.

Just one-fifth (20.1%) of students had eaten fruits and vegetables at least five times per day during the seven days preceding the survey. (See Figure:
More male (21.4%) than female (18.7%) students reported having eaten fruits and vegetables five or more times per day. Even fewer students (16.2%) had drunk at least three glasses of milk per day than had eaten the recommended servings of fruit and vegetables during the seven days preceding the survey. (See Figure: 

The prevalence of having consumed at least three glasses of milk per day was higher among male (20.8%) than female (11.6%) students.

Figure:
reveals that nearly one-third (31.5%) of high school students described themselves as “slightly” or “very” overweight. Many more teenaged girls (38.1%) than teenaged boys (25.1%) considered themselves overweight. Overall, almost half (45.6%) of the students said they were trying to lose weight, but twice as many female teens (61.7%) as male teens (29.9%) reported making an effort to lose weight. (See Figure:
Strategies for losing weight varied. Figure:
shows that more than two-thirds (67.4%) of teenaged girls and more than half (52.9%) of teen boys exercised to lose or maintain their weight. More than half (54.8%) of female teens and more than one-quarter (26.8%) of male teens said they had tried to lose or control their weight by eating less, counting calories, or choosing foods low in fat during the month preceding the survey. (See Figure:)

**Percentage of students who exercised to lose or keep from gaining weight, 2005**

![Bar chart showing exercise percentages for total, females, and males.]

**Source:** “Percentage of Students Who Exercised to Lose Weight or to Keep from Gaining Weight during the Past 30 Days,” in YRBSS Youth Online: Comprehensive Results, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health, March 19, 2007, http://apps.nccd.cdc.gov/yrbss/displaygraphv.asp?path=byHT&colval=2005&rowval1=Sex&rowval2=None&compval=&Graphval=yes&cat=5&loc=XX&year=2005&quest=Q66&Byvar=Q2&ByResvar=CI (accessed October 11, 2007)
However, 17% of teen girls and 7.6% of teen boys said they had gone without eating for twenty-four hours or more, and 8.1% of teen girls and 4.6% of teen boys had taken diet pills, powders, or liquids without a doctor's advice in an effort to lose weight. (See Figure:
Percentage of students who went without eating for 24 hours or more to lose or to keep from gaining weight, 2005

![Bar chart showing percentage of students who went without eating for 24 hours or more to lose or to keep from gaining weight, 2005. The chart indicates that 12.3% of the total, 17.0% of females, and 7.6% of males went without eating.]

SOURCE: “Percentage of Students Who Went without Eating for 24 Hours or More to Lose Weight or to Keep from Gaining Weight during the Past 30 Days,” in YRBSS Youth Online: Comprehensive Results, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health, March 19, 2007, http://apps.nccd.cdc.gov/yrbss/displaygraphV.asp?path=byHT&colval=2005&rowval1=Sex&rowval2=None&compval=&Graphval=yes&cat=5&loc=XX&year=2005&quest=Q68&Byvar=Q2&ByResvar=CI (accessed October 11, 2007)
Is Fast Food to Blame?

In “Effects of Fast-Food Consumption on Energy Intake and Diet Quality among Children in a National Household Survey” (Pediatrics, vol. 113, no. 1, January 2004), Shanthy A. Bowman et al. state that one-third of U.S. children eat fast food on any given day, consuming extra calories, sugar, and fat in the process. When the researchers looked at the diets of 6,212 children and teens, they found that children of all races, incomes, and U.S. regions commonly consumed fast-food meals. Bowman et al. indicate that on a typical day, more than 30% of U.S. children aged four to nineteen ate burgers, fries, and other fast-food fare. They
report that children who ate fast food consumed an average of 187 more calories than did those who did not eat fast food, and, on average, children ate 126 extra calories on the days they ate fast food, compared to fast food–free days. Bowman et al. calculate that the extra fast-food calories could result in an additional six pounds of weight gain in a year.

To determine how much soda and fast food California teenagers consume, Theresa A. Hastert et al. of the University of California, Los Angeles Center for Health Policy Research analyzed data from four thousand twelve- to seventeen-year-old participants in the 2003 California Health Interview Survey and reported their findings in More California Teens Consume Soda and Fast Food Each Day than Five Servings of Fruits and Vegetables (September 2005, http://www.healthpolicy.ucla.edu/pubs/files/teen_fastfood_PB.pdf). They find that more than 2 million California teens—66.3% of the total teen population in the state—drink soda every day and about 1.5 million (48%) eat fast food daily. The average California teen drinks 1.4 sodas per day, and consumption of soda and other sugary beverages increases with age. Seventeen-year-olds reported drinking 40% more soda (1.7 per day) than twelve-year-olds (1.2 per day). Teenaged boys drink about 25% more soda and sweet drinks than do teenaged girls, and African-American teens drink the most—averaging two sodas per day. Soda consumption declines with increasing household income. Teens with household income below 300% of the federal poverty limit drink more soda (1.5 to 1.6 per day) than teens from more affluent homes. Soda consumption was 25% higher among teens who said that sodas were available in school vending machines.

Nearly half (48%) of the state's teens eat fast food every day, and many eat fast food more than once a day. Almost 10%—more than three hundred thousand California teens—have fast food twice a day, and ninety thousand (2.7%) eat fast food three or four times a day. As with soda consumption, more teens from low- and moderate-income homes eat fast food every day, and daily fast food consumption increases with age from 43.7% of twelve-year-olds to more than half (51.9%) of seventeen-year-olds. Hastert et al. find that 20.9% of California teens eat the recommended five servings of fruit and vegetables each day. Not surprisingly, they also note a relationship between fast-food consumption and eating the recommended servings of fruits and vegetables. The more often teens eat fast food, the less likely they are to eat fruits and vegetables. Significantly more teens who do not eat fast food eat five or more servings of fruit and vegetables per day.

**The Role of the Media**

Despite recent television and print media antiobesity campaigns, many industry observers condemn corporate marketing efforts and media for continuing to assault children with unhealthy messages that encourage them to eat junk foods. The CDC defines junk foods as those that provide calories primarily through fats or added sugars and have minimal amounts of vitamins and minerals. According to the article “Beware of Junk Food Marketeers” (CBSNews.com, November 11, 2003), Michael F. Jacobson, the executive director of the Center for Science in the Public Interest (CSPI), a nonprofit nutrition advocacy group based in Washington, D.C., believes that the United States has permitted junk-food marketers—not only fast-food companies but also makers of sugary cereals and high-fat, high-calorie chips—to target children. He charges that the marketing of fatty, sugary, and low-nutrient foods has reached an all-time high and is fueling childhood obesity, and he calls for restricting promotions targeted at the young.

Jacobson observes that even if parents lead by example in terms of healthy eating habits, it is still unfair to allow companies with slick, aggressive, and sophisticated advertising campaigns to bypass parents,
undermine parental authority, and directly influence children's food choices. Jacobson believes that parents must assume responsibility for ensuring that their children eat healthy meals and snacks; however, he says the marketers and media have an unfair advantage, “Companies are going directly to kids and saying, ‘Eat this, eat this, drink this, drink this, it’s yummy—you’ll love it.’ Parents have to say ‘No, no, no,’ and how many parents say no a thousand times?”

The CSPI called on the U.S. Department of Health and Human Services to work with Congress and the Federal Trade Commission to limit junk-food advertising aimed at children. Currently, federal rules do not restrict advertising content to children, only how much time ads can interrupt children's programming—10.5 minutes per hour on weekends and 12 minutes per hour during the week. The CSPI also advocates government-sponsored media campaigns that encourage healthy eating and physical activity.

According to the press release “BBB Announces Burger King Corp. Joins Children's Food and Beverage Advertising Initiative” (September 12, 2007, http://www.bbb.org/Alerts/article.asp?ID=798), the Children's Food and Beverage Advertising Initiative announced in September 2007 that the companies that accounted for more than two-thirds of children's food and beverage advertising expenditures in 2004—Burger King Corp.; Cadbury Adams, USA, LLC; Campbell Soup Company; the Coca-Cola Company; General Mills, Inc.; the Hershey Company; Kellogg Company; Kraft Foods Inc.; Mars, Inc.; McDonald's USA, LLC; PepsiCo, Inc.; and Unilever United States—had voluntarily agreed to reduce or stop marketing unhealthy foods to children. Participating companies have also resolved to:

- Limit products shown in interactive games to healthier dietary choices, or incorporate healthy lifestyle messages into the games
- Not engage in food and beverage product placement in editorial and entertainment content
- Reduce the use of popular cartoon and other characters in advertising
- Not advertise food or beverage products in elementary schools

Educators and marketers observe that even though corporations may agree not to advertise in schools, they remain eager to maintain a high-profile presence in schools, which enables them to remain highly visible to students. In 2005 McDonald's launched its “Passport to Play” program, which provides free lesson plans and materials to third- through fifth-grade physical education teachers. In the fact sheet “McDonald's® Commitment to Balanced, Active Lifestyles” (2006, http://www.mcdepk.com/2006worldcupresourcecenter/mediadocs/global_bal_fact_sheet.pdf), McDonald's describes the program, which has been distributed to elementary schools nationwide, as reflecting the company's “commitment to balanced, active lifestyles today.” Some critics object to commercialism of any kind in the schools, even if the message encourages healthy choices. Others believe that it is hypocritical for purveyors of low-nutrient foods to link these foods to physical fitness or athletic prowess.

Lloyd D. Johnston, Jorge Delva, and Patrick M. O'Malley note in “Soft Drink Availability, Contracts, and Revenues in American Secondary Schools” (American Journal of Preventive Medicine, vol. 33, no. 4, supplement, October 2007) that many schools still offer students ready access to junk food and beverages via vending machines (88%) and in the cafeteria at lunch (59%). In 2005, 83% of high schools and 67% of middle schools had contracts with a soft drink manufacturer.

However, students are beginning to have some healthier beverage options in school. In September 2007
the Alliance for a Healthier Generation, a collaboration of the American Heart Association and the William J. Clinton Foundation, announced in “Alliance for a Healthier Generation Statement of Support for American Beverage Association School Beverage Guidelines Progress Report” (http://www.healthiergeneration.org/uploadedFiles/For_Media/Alliance20Statement-ABA.pdf) that the three largest beverage companies—Coca-Cola, PepsiCo, and Cadbury Schweppes—agreed to remove high-calorie, sugar-laden sodas from schools. Elementary and middle schools will offer students water, low-fat milk, and 100% juice. High school students will be able to purchase sports drinks, light juices, and diet drinks.

Even though there is widespread agreement that removing soda from schools is a healthy move, some nutritionists feel that the proposed beverage choices, which include vitamin-enhanced water that also contains sugar, still favor beverage company interests rather than students' health. According to Andrew Martin, in “Sugar Finds Its Way Back to the School Cafeteria” (New York Times, September 16, 2007), Margo Wootan, the CSPI director of nutrition policy, opined that the terms of the agreement left “a huge loophole that will bring lots more sugar and calories into kids' diets.”

The Media Can Deliver Powerful Nutrition and Health Education

Greater emphasis on children's diets has inspired the media to offer nutrition education. Rather than subsisting on a diet of cookies alone, Sesame Street's Cookie Monster now champions healthy food choices. The beloved character is singing a new tune, “A Cookie Is a Sometimes Food.” SpongeBob SquarePants, who in the past appeared on Breyer's ice cream cartons and Kellogg's sweetened cereals, has relocated to the produce section and is advocating fresh produce consumption. Along with SpongeBob SquarePants, Dora the Explorer and other Nickelodeon characters appear on packages of fruit and vegetables, under licensing agreements with produce companies. Clifford the Big Red Dog promotes an organic cereal with his name and likeness, and Arthur the aardvark has loaned his name and likeness to Arthur's Loops, another organic cereal.

Children's television programming such as Jo Jo's Circus on Disney and Nickelodeon's Lazy Town aim to inspire young viewers to be physically active. Blending fitness and entertainment, videogame makers have developed a genre of active rhythm games including Dance Dance Revolution, which features a workout mode that can track how many calories the user burns while playing. In the Groove and Pump It Up: Exceed are videogames in which players try to match the onscreen action by stepping on different sections of a floor pad, and Yourself! Fitness and Kinetic offer teens exercise routines in videogame formats. Escape from Obeez City is an interactive DVD game that teaches children about the dangers of poor nutrition and inactivity, motivating them to change their behavior. As part of its antiobesity efforts, the National Institutes of Health is funding videogame research projects in the United States.

Many Schools Offer and Promote Unhealthy Food Choices

Food manufacturers and marketers know that schools are ideal sites to promote their products to children and teens. Nearly all youth attend school and spend many of their waking hours at school. Furthermore, the presence of foods in schools allows food companies to benefit from the implied endorsement of the schools and teachers. According to the CDC, in “Competitive Foods and Beverages Available for Purchase in Secondary Schools—Selected Sites, United States, 2004” (Morbidity and Mortality Weekly Report, vol. 54, no. 37, September 23, 2005), 98% of high schools, 74.5% of middle schools, and 43.1% of elementary schools have vending machines, stores, or snack bars on campus that sell “competitive foods”—foods that
are not part of federally reimbursable school meals. Figure:

![Categories and sources of competitive foods in schools](image)

shows the types and sources of competitive foods in schools. The nutritional value of competitive foods is essentially unregulated, and students often purchase these foods instead of, or besides, school meals.

Besides selling food in schools, food manufacturers advertise on vending machines, posters, book covers, scoreboards, and banners and offer schools educational materials, contests in which children receive prizes or food rewards for achievement, and fund-raising opportunities. Some critics, including the CSPI, assert that the manufacturers are taking unfair advantage of cash-strapped school districts.

**Schools Sell Competitive Foods and Obtain Substantial Revenues from Their Sale.**

In *School Meal Programs: Competitive Foods Are Available in Many Schools; Actions Taken to Restrict Them Differ by State and Locality* (April 2004, http://www.gao.gov/new.items/d04673.pdf), the U.S. General Accounting Office (GAO; now the U.S. Government Accountability Office) finds that by 2004 several states had enacted competitive food policies that were more stringent than those required by federal regulations. However, the policies and practices varied widely. In 2005 the GAO analyzed data from two nationally representative surveys to determine the prevalence of competitive foods in schools, the groups involved in their sale, restrictions on competitive foods, and the amounts and use of revenue generated by their sale. The GAO issued its findings in *School Meal Programs: Competitive Foods Are Widely Available and Generate Substantial Revenues for Schools* (August 2005, http://www.gao.gov/new.items/d05563.pdf).
The GAO analysis finds that nearly all schools sold competitive foods during the 2003–04 school year, with middle schools and high schools more likely than elementary schools to offer competitive foods. In one-third of schools, sweet baked goods, salty snacks, and other less-nutritious foods were available in cafeteria snack lines. Schools often sold competitive foods at lunchtime, in the cafeteria or nearby, allowing kids to buy them for lunch or to supplement their lunch. Table:
categorizes the types of competitive foods that are frequently available through all venues in elementary, middle, and high schools.

<table>
<thead>
<tr>
<th>Types of competitive foods often or always available through any venue in schools, by school level and nutrition category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Elementary schools</strong></td>
</tr>
<tr>
<td>Water</td>
</tr>
<tr>
<td>Milk, 1% or skim</td>
</tr>
<tr>
<td>Milk, whole or 2%</td>
</tr>
<tr>
<td>100% juice</td>
</tr>
<tr>
<td>Fruit</td>
</tr>
<tr>
<td>Vegetables and/or salad</td>
</tr>
<tr>
<td>Yogurt</td>
</tr>
<tr>
<td>Less than 100% juice</td>
</tr>
<tr>
<td>Sports drinks</td>
</tr>
<tr>
<td>Low-fat salty snacks</td>
</tr>
<tr>
<td>Low-fat sweet baked goods</td>
</tr>
<tr>
<td>Low-fat frozen desserts</td>
</tr>
<tr>
<td>Sandwiches</td>
</tr>
<tr>
<td>Pizza</td>
</tr>
<tr>
<td>Fried vegetables</td>
</tr>
<tr>
<td>Frozen desserts (not low-fat)</td>
</tr>
<tr>
<td>Salty snacks (not low-fat)</td>
</tr>
<tr>
<td>Sweet baked goods (not low-fat)</td>
</tr>
<tr>
<td>Candy</td>
</tr>
<tr>
<td>Soda</td>
</tr>
</tbody>
</table>

- **Nutritious**
- **Neither clearly nutritious nor less nutritive**
- **Less nutritive**

m Item is estimated to be available in approximately half or more schools with any venue

o Item is estimated to be available in approximately one-third or more schools with any venue

Note: The nutrition categories, as signified by the shading, are general descriptions of the foods in each category. Nutritional content can vary depending on the ingredients and the methods used to prepare foods.

The GAO analysis reveals that the between 1998–99 and 2003–04 the availability of competitive food venues in middle schools rose from 83% to 97%. During this same period, the number of middle schools with exclusive beverage contracts and the number of vending machines per school also increased. Nearly 75% of high schools, 65% of middle schools, and 30% of grade schools had exclusive beverage contracts in 2004. Similarly, the volume and variety of competitive foods sold increased in more than two-thirds of high schools, more than half of middle schools, and nearly one-third of elementary schools. School administrators attributed the increases to student demand, providing more nutritious and appealing food choices, and generating additional revenues for the school food service.

In 2003–04 schools, particularly middle and high schools, generated considerable revenues through competitive food sales. In terms of sales, the top 29% of high schools generated more than $125,000 per school. The GAO also finds that all the school districts it examined had taken action to substitute healthy foods for less-nutritious competitive foods. The districts acknowledged that chief among the obstacles to enacting these changes was concern about revenue losses.

Food for Thought Has New Meaning At Many Schools

The 2004 reauthorization of the federal Child Nutrition Act required every school district that receives federal funds to establish a local wellness policy by June 30, 2006, and U.S. Department of Agriculture (USDA) dietary guidelines released in January 2005 prompted many schools’ food services to offer more whole grains and fresh fruits and vegetables. Even before legislation mandated changes, and certainly afterward, many school districts replaced some of the food and beverages available in their schools. For example, Andrew Martin states in “The School Cafeteria, on a Diet” (New York Times, September 5, 2007) that in 2007 California schools eliminated deep-fried foods, substituting baked chicken nuggets and fries. An Alabama school stopped serving sweetened tea and substituted baked potato chips for regular chips.

Connecticut was the first state to pass a ban on selling sugar-sweetened sodas in schools. Similar bills have been introduced in many other states. In 2004 schools in Philadelphia, Pennsylvania, instituted a no-soda policy, and in 2005 California banned the sale of soda in state high schools. According to the article “Schools Serving Healthier Drinks—Report” (CNN.com, September 17, 2007), in 2007 twenty-two states limited the sale of soda and other sugary drinks in some grades.

New Jersey schools have adopted what may be the most ambitious statewide school nutrition policy in the nation. Since 2007 all the state’s public schools adhere to a policy stipulating that soda, any food item listing sugar as its first ingredient, all forms of candy, and foods of minimal nutritional value (per the USDA definition) cannot be served, sold, or given for free anytime during the school day. Snacks and drinks sold anywhere on a school campus must have no more than eight grams of fat and two grams of saturated fat per serving, and drinks cannot exceed more than twelve ounces, except bottled water. This policy applies to vending machines, cafeterias, à la carte items, school stores, school fund-raisers, and the after-school snack program. The policy also makes nutrition education a requirement in school curricula.

High School Physical Education Programs

School physical education programs, especially high school programs, have been found as lacking as school nutrition programs. The CDC finds in “Youth Risk Behavior Surveillance System” that, nationwide,
54.2% of students went to physical education (PE) classes on one or more days in an average week when they were in school. (See Figure:  

**Percentage of students who attended physical education classes one or more days per week, 2005**

![Bar chart showing percentages for total, females, and males.](chart.jpg)

**SOURCE:** “Percentage of Students Who Attended Physical Education (PE) Classes on One or More Days in an Average Week When They Were in School,” *YRBSS Youth Online: Comprehensive Results*, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health, March 19, 2007, [link](http://apps.nccd.cdc.gov/yrbss/displaygraphV.asp?path=byHT&colval=2005&rowval1=Sex&rowval2=None&compval=&Graphval=yes&cat=6&loc=XX&year=2005&quest=Q82&Byvar=Q2&ByResvar=CI (accessed October 13, 2007)

.) Just one-third (33%) of students attended daily PE classes. (See Figure:
Among students enrolled in PE classes, 84% actually exercised or played sports for more than twenty minutes during an average PE class. (See Figure:

Percentage of students who attended daily physical education classes, 2005

The importance of school PE programs cannot be underestimated, especially in view of the survey finding that only a little more than one-third (35.8%) of students had participated in sufficient physical activity—sixty minutes or more on at least five days—during the week preceding the survey. (See Figure:)

**Percentage of students who actually exercised or played sports more than 20 minutes during an average physical education class, 2005**

![Bar chart showing percentage of students exercising or playing sports](chart.png)

Many more male teens (43.8%) than female teens (27.8%) said they had been active for sixty minutes or more on at least five of the past seven days.

More than two-thirds (68.7%) of students had exercised vigorously for twenty or more minutes, three or more times per week in the seven days preceding the survey. (See Figure:)

SOURCE: "Percentage of Students Who Were Physically Active for a Total of 60 Minutes or More per Day on Five or More of the Past Seven Days," YRBSS Youth Online: Comprehensive Results, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health, March 19, 2007, http://apps.nccd.cdc.gov/yrbss/displaygraphV.asp?path=byHT&colval=2005&rowval1=Sex&rowval2=None&compval=&Graphval=yes&cat=6&loc=XX&year=2005&quest=Q80&Byvar=Q2&ByResvar=CI (accessed October 13, 2007)
Percentage of students who had participated in at least 20 minutes of vigorous physical activity on three or more of seven days and/or at least 30 minutes of moderate physical activity on five or more of seven days, 2005

SOURCE: “Percentage of Students Who Had Participated in at least 20 Minutes of Vigorous Physical Activity on Three or More of the Past Seven Days and/or at least 30 Minutes of Moderate Physical Activity on Five or More of the Past Seven Days,” in YRBSS Youth Online: Comprehensive Results, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health, March 19, 2007, http://apps.nccd.cdc.gov/yrbss/displaygraphV.asp?path=byHT&colval=2005&rowval1=Sex&rowval2= None&compval=&Graphval=yes&cat=6&loc=XX&year=005&quest=509&Byvar=Q2&ByResvar=CI (accessed October 13, 2007)

.) Once again, more male (75.8%) than female (61.5%) students reported exercising vigorously. Figure:
shows that 11.3% of female students and 7.9% of males had not participated in any vigorous or moderate physical activity in the seven days preceding the survey. Further reinforcing the notion that American teens lead relatively sedentary lives, 38% of male high school students and 36.3% of female students reported watching three or more hours of television on an average school day. (See Figure:)

Health Risks and Consequences

The harmful health consequences of overweight and obesity can begin during childhood and adolescence. According to John J. Reilly et al., in “Health Consequences of Obesity” (Archives of Disease in Childhood, vol. 88, no. 9, 2003), nearly 60% of overweight children have at least one cardiovascular risk factor, compared to 10% of those with a BMI-for-age less than the eighty-fifth percentile, and 25% of overweight children have two or more risk factors. The most frequently occurring medical consequences of overweight among children and adolescents are:

- Elevated blood lipids—overweight children and adolescents display the same elevated levels of cholesterol, triglycerides, and/or low-density lipoproteins as overweight adults. These hyperlipidemias...
are linked to an increased risk for cardiovascular disease and premature mortality (death) in adulthood.

- **Glucose intolerance and Type 2 diabetes**—glucose intolerance, a carbohydrate intolerance that varies in severity, is a forerunner of diabetes. The incidence of Type 2 diabetes (also called noninsulin-dependent diabetes mellitus) among adolescents is increasing in response to the national rise in overweight among teens. A skin condition known as acanthosis nigricans—velvety thickening and darkening of skinfold areas at the neck, elbow, and behind the knee—often coexists with glucose intolerance in youth.

- **Fatty liver disease**—high concentrations of liver enzymes are associated with fatty degeneration of the liver (also called hepatic steatosis) and have been found in overweight children and adolescents. Excessively high blood insulin levels (hyperinsulinemia) may contribute to the genesis of this disease.

- **Gallstones**—even though gallstones occur less frequently among children and adolescents who are overweight than in obese adults, nearly half of the cases of inflammation of the gallbladder (also called cholecystitis) in adolescents may be associated with overweight. Like adults, the risk for cholecystitis and gallstones in adolescents may decrease with weight reduction.

Another common health consequence of overweight is early maturation, a condition in which measurement of skeletal age is more than three months greater than chronological age. Early maturation is linked to overweight in adulthood and is also associated with the distribution of fat—it predicts the fat predominantly located on the abdomen and trunk that is in turn predictive of increased disease risk.

Less frequently occurring health consequences include hypertension (high blood pressure), a condition that is nine times more frequent among children who are overweight, compared to other children; obstructive sleep apnea (breathing becomes shallow or stops completely for short periods during sleep), a condition that afflicts an estimated 7% of overweight children; and orthopedic problems resulting from excessive stress on the feet, legs, and hips. Hypertension for children and adolescents one to seventeen years old is defined as average blood pressure readings at or above the ninety-fifth percentile (based on age, sex, and height) on at least three separate occasions. (See Table:)

![Blood pressure levels for the 90th and 95th percentiles of blood pressure for boys ages 1 to 17 years](image)

and Table:
for blood pressures by age and gender that are considered indicative of hypertension or at risk for hypertension. Children and adolescents between the ninetieth and ninety-fifth percentiles for their age, sex, and height are at risk for developing hypertension. According to the CDC, in Overweight Children and Adolescents: Recommendations to Screen, Assess, and Manage (2002, http://www.cdc.gov/NCCdphp/dnppa/growthcharts/training/modules/module3/text/module3print.pdf), several studies confirm that blood pressure and change in BMI during childhood are the two most powerful predictors of adult blood pressure across all ages and both genders.

**Metabolic Syndrome**

The metabolic syndrome is a group of risk factors for atherosclerotic cardiovascular disease and Type 2 diabetes mellitus in adults that includes insulin resistance, obesity, hypertension, and hyperlipidemia. (Atherosclerosis is a hardening of the walls of the arteries caused by the buildup of fatty deposits on the inner walls of the arteries that interferes with blood flow.) Atherosclerotic cardiovascular disease is the leading cause of death among adults, but rarely occurs in young people. Recently, however, the risk factors—high blood pressure, elevated triglycerides (a fatty substance found in the blood), obesity, and low levels of the “good” high-density lipoprotein (HDL) cholesterol—associated with its development have been appearing during childhood.

Joanne S. Harrell, Ann Jessup, and Natasha Greene of the University of North Carolina at Chapel Hill find in “Changing Our Future: Obesity and the Metabolic Syndrome in Children and Adolescents” (Journal of Cardiovascular Nursing, vol. 21, no. 4, July–August 2006), a study of thirty-two hundred boys and girls aged eight to seventeen years old, that there was a much higher prevalence of risk factors for metabolic syndrome than in previous studies. More than half of the subjects had at least one of six risk factors—obesity, high blood pressure, high triglycerides, low levels of HDL cholesterol, glucose intolerance, and elevated insulin levels—for metabolic syndrome. The most common risk factor, found in more than 43% of the subjects, was a low HDL cholesterol level. More than 27% had two or more risk factors, and 13.5% had at least three risk factors. More girls (16.3%) than boys (10.7%) had at least three risk factors for metabolic syndrome. More than 8% of the children who had three or more factors were between eight and nine years
old. Harrell, Jessup, and Greene hope that the results of their study will serve as a warning that without effective intervention many children and teenagers with these risk factors will develop Type 2 diabetes and heart disease.

In “Diagnosis of the Metabolic Syndrome in Children” (Current Opinion in Lipidology, vol. 14, no. 6, December 2003), a review of recent research, Julia Steinberger of the University of Minnesota Medical School finds that the process of atherosclerosis starts at an early age and is linked to obesity in childhood. Obesity beginning in childhood often precedes the hyperinsulinemia, and other components of the metabolic syndrome are also present in children and adolescents. Being overweight during childhood and adolescence is significantly associated with insulin resistance, dyslipidemia (high low-density lipoprotein and triglycerides, and low HDL), and high blood pressure in young adulthood. In view of the increasing prevalence of metabolic syndrome in children and adolescents, Steinberger recommends that “the first approach should focus on prevention of obesity in childhood. More attention should be paid to increasing physical activity and decreasing calorie consumption in this age group. Once obesity is established in a child or adolescent, vigorous clinical efforts should be directed at treating it.”

Sarah P. Garnett et al. of the Institute of Endocrinology and Diabetes in Westmead, Australia, observe in “Body Mass Index and Waist Circumference in Midchildhood and Adverse Cardiovascular Disease Risk Clustering in Adolescence” (American Journal of Clinical Nutrition, vol. 86, no. 3, September 1, 2007), that overweight and obese eight-year-olds were seven times more likely than their healthy-weight peers to have heart disease risk factors such as high blood pressure, unhealthy cholesterol levels, and elevations in blood sugar and insulin, by age fifteen. Garnett et al. opine that their findings, that these risk factors persist and increase over time, underscore the importance of preventing childhood obesity.

**Mental Health Consequences**

One of the most immediate, distressing, and widespread consequences of being overweight as described by children themselves is social discrimination and low self-esteem. Overweight and obese children and adolescents are at risk for psychological and social adjustment problems such as considering themselves less competent than normal-weight youth in social, athletic, and appearance arenas, as well as suffering from overall diminished self-worth. In “Health-Related Quality of Life of Severely Obese Children and Adolescents” (Journal of the American Medical Association, vol. 289, no. 14, April 9, 2003), Jeffrey B. Schwimmer, Tasha M. Burwinkle, and James W. Varni find that obese children rated their quality of life with scores as low as those of young cancer patients undergoing chemotherapy (medical treatment to combat cancer). The researchers analyzed the responses of 106 children aged five to eighteen to a questionnaire used by pediatricians to evaluate quality-of-life issues. Study participants were asked to rate attributes such as their ability to walk more than one block, play sports, sleep well, get along with others, and keep up in school.

The results indicated that teasing at school, difficulties playing sports, fatigue, sleep apnea, and other obesity-linked problems severely affected obese children’s well-being. The obese subjects were five times more likely than healthy children and adolescents to have impaired physical functioning and nearly six times more likely to suffer impaired psychosocial functioning. They were four times more likely than healthy children and adolescents to report impaired school function and had missed a mean of 4.2 days of school in the month before the study, compared to less than one day of school missed for children who were not overweight. When the parents of the subjects completed the same questionnaire, their ratings of their
children's abilities and well-being were even lower than the children's self-reported ratings.

Lucy Jane Griffiths et al. report in “Obesity and Bullying: Different Effects for Boys and Girls” (Archives of Disease in Childhood, vol. 91, 2006) that obese children engage in more bullying behavior, at least in part because they deviate from appearance ideals. Obese boys were more than one and a half times more likely to use their physical dominance to bully other children or to be victims of bullying than their normal-weight or overweight peers. Obese girls were more likely to be victims of bullying than their normal-weight peers.

In “Obesity, Shame, and Depression in School-Aged Children: A Population Study” (Pediatrics, vol. 116, no. 3, September 2005), Rickard L. Sjöberg, Kent W. Nilsson, and Jerzy Leppert indicate that depression is common among obese teenagers and largely results from teens' experiences of being shamed. The researchers analyzed data from 4,703 teens aged fifteen and seventeen years and found that obese teens reported experiencing more symptoms of depression than their normal-weight or overweight peers and had a higher risk of depression. Obese teens were more likely than their normal-weight or overweight peers to say they had been treated in a degrading manner, had been ignored, or otherwise had shaming experiences within the past three months. Furthermore, adolescents who reported the highest number of shame experiences were more than eleven times more likely to be depressed than those who reported the lowest number of shame experiences. Sjöberg, Nilsson, and Leppert conclude, “These results suggest that clinical treatment of obesity may sometimes not just be a matter of diet and exercise but also of dealing with issues of shame and social isolation.”

Obese children are also absent from school more frequently than their healthy-weight peers. Andrew B. Geier et al. find in “The Relationship between Relative Weight and School Attendance among Elementary Schoolchildren” (Obesity, vol. 15, 2007) that on average the healthy-weight students were absent 10.1 days, overweight children missed 10.9 days, and obese children missed 12.2 days. The researchers note that being overweight or obese is a better predictor of absenteeism than the factors (race, socioeconomic status, age, and gender) previously thought to have the best predictive value for school attendance. Even though some of the increased absenteeism may be due to health problems, Geier et al. think that social problems such as fear of being bullied, embarrassed, or excluded account for a considerable amount of the observed absences.

### Screening and Assessment of Overweight Children and Adolescents

In view of the rising prevalence of overweight youth, screening children and adolescents for overweight and risk for overweight has assumed a prominent place in pediatric practice (the medical specialty devoted to diagnosis and treatment of children) and public health programs. The Recommendations for Preventive Pediatric Health Care by the American Academy of Pediatrics advise a frequent schedule of accurate weight and height measurements to determine whether children require further assessment or treatment for overweight. Screening distinguishes between youths who are not at risk of overweight, at risk of overweight, and overweight. Those deemed overweight receive an in-depth medical assessment; those considered at risk are assessed for changes in BMI, blood pressure, and cholesterol levels; and annual screening is advised for those who are not at risk of overweight.
The comprehensive assessment performed on overweight children and adolescents generally includes obtaining a detailed medical history to identify any underlying medical conditions that may contribute to overweight and analyzing family history for the presence of familial risks for overweight or obesity. Relevant familial factors include the occurrence of obesity, eating disorders, Type 2 diabetes, heart disease, high blood pressure, and abnormal lipid profiles such as high cholesterol among immediate family members. The assessment may also involve:

### Table:

<table>
<thead>
<tr>
<th>Total cholesterol, ng/dL</th>
<th>LDL cholesterol, ng/dL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable</td>
<td>&lt;170</td>
</tr>
<tr>
<td>Borderline</td>
<td>170–199</td>
</tr>
<tr>
<td>High</td>
<td>Greater than or</td>
</tr>
<tr>
<td></td>
<td>equal to 200</td>
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<tr>
<td></td>
<td>Greater than or</td>
</tr>
<tr>
<td></td>
<td>equal to 130</td>
</tr>
</tbody>
</table>

Note: High-risk children are defined as those from families with hypercholesterolemia or premature cardiovascular disease.


shows the range of values for total blood cholesterol and low-density lipoprotein cholesterol that are considered acceptable, borderline, and high.

- Dietary evaluation to consider the quantity, quality, and timing of food consumed to identify foods and patterns of eating that may lead to excessive calorie intake. A food record or food diary may be used to assess eating habits.
- An evaluation of daily activities. This assessment involves an estimate of time devoted to exercise and activity as well as time spent on sedentary behaviors such as television, videogames, and computer use.
- A physical examination to provide information about the extent of overweight and any complications of overweight, including high blood pressure. Children and adolescents with a BMI-for-age at or above the ninety-fifth percentile and who are athletic and muscular may be further assessed using triceps skinfold measurement to assess body fat. A measurement of greater than the ninety-fifth percentile indicates that the child has excess fat rather than increased lean body mass or a large frame.
- Laboratory tests, such as cholesterol screening, dictated by the degree of overweight, family history, and the results of the physical examination.
- A mental health evaluation to determine the readiness of children and adolescents to change behaviors
and to identify a history of eating disorders or depression that may require treatment. An assessment of the family's ability to support a child's weight-loss or weight-management efforts may also be performed.

**Intervention and Treatment of Overweight and Obesity**

In the absence of acute medical necessity, such as with children who are dangerously obese, most health professionals concur that drastic caloric restriction is an inappropriate weight-loss strategy for children who are still growing. Instead, they advise efforts to stabilize body weight with a healthy, balanced diet, increased physical activity, and education about nutrition, food choices, and preparation. This approach is especially effective for children who are just slightly overweight, because maintaining body weight often allows them to outgrow overweight and become normal-weight adults.

When active weight loss is indicated, it is generally for children with a BMI greater than the ninety-fifth percentile or those experiencing complications of overweight or obesity. Among children aged two to seven, gradual weight loss of about one pound per month is advised. Older children with serious health risks who are severely overweight (BMI greater than 35) may be advised to lose between one and two pounds per week.

Many studies confirm that dietary interventions with children and teens are as ineffective long term as they are with adults. In “Treatment of Pediatric and Adolescent Obesity” (*Journal of the American Medical Association*, vol. 289, no. 14, April 9, 2003), Jack A. Yanovski and Susan Z. Yanovski of the National Institutes of Health observe that studies find that long-term weight reduction is maintained in only about half of children and adolescents treated with intensive behavioral-modification therapy. Furthermore, they characterize effective behavior-modification programs lacking widespread applicability because they are labor-intensive, not easily conducted by primary care physicians (pediatricians and family medicine physicians), and require intensive involvement from parents. Many practitioners believe that behavior modification alone is insufficient for severely obese children and adolescents. For this population, researchers and practitioners have had success with pharmacotherapy—drug treatment with medications known as anorexiants, which reduce appetite by blocking the reuptake of the neurotransmitters norepinephrine and serotonin. The most serious adverse effects of these medications are an increase in blood pressure and pulse rate sufficient to warrant reducing the drug dose or discontinuing it altogether. Like many other researchers and clinicians, Yanovski and Yanovski conclude that it “remains exceedingly difficult for overweight children and adolescents to lose weight, and even more difficult for them to sustain that weight loss long term. The ultimate goal must be prevention of the development of overweight in children and adolescents.”

Robert I. Berkowitz et al. compared the efficacy of family-based behavioral treatment alone to a combined regimen of family-based behavioral therapy and weight-loss medication among adolescents. The researchers reported the results of their study in “Behavior Therapy and Sibutramine for the Treatment of Adolescent Obesity” (*Journal of the American Medical Association*, vol. 289, no. 14, April 9, 2003). For the first six months of the study, eighty-two participants aged thirteen to seventeen with BMIs ranging from 32 to 44 received behavior therapy and sibutramine (an anorexiant medication) or behavior therapy and a placebo (an inactive compound). During the second six months, all participants received behavioral treatment and sibutramine.
During the first phase, behavioral treatment called for participants to attend thirteen weekly group sessions followed up by six biweekly group sessions. In the second phase, the group sessions were conducted biweekly from months seven to nine and monthly from months ten to twelve. Parents met in separate group sessions held on the same schedule as the adolescents’ meetings. Dietitians, psychologists, or psychiatrists conducted the groups. Participants in both treatment groups were instructed to consume a twelve-hundred-to fifteen-hundred-calorie diet of conventional foods, with approximately 30% of their calories derived from fat, 15% from protein, and the remainder from carbohydrates. They were advised to incrementally increase their physical activity with the goal of walking or participating in aerobic activity for 120 minutes per week or more. Participants kept daily eating and activity logs that they submitted at each session.

At the end of the first six months, participants in the behavioral treatment and sibutramine group lost a mean of 17.2 pounds and had an 8.5% reduction in BMI, which was significantly more than the weight loss of 7.1 pounds and a reduction in BMI of 4% in the behavioral treatment and placebo group. Participants who received behavioral treatment and sibutramine also reported significantly less hunger. From months seven to twelve, participants initially treated with sibutramine maintained their weight loss with continued use of the medication, whereas those who switched from placebo to sibutramine lost an additional 2.9 pounds. Berkowitz et al. explain the behavioral treatment and sibutramine participants’ failure to lose further weight during the second phase of the study as consistent with the observation that weight loss tends to plateau in obese adults after six months of treatment with behavior therapy or pharmacotherapy.

Berkowitz et al. conclude that weight-loss medications may be of benefit to adolescents. However, they caution that their use must be carefully monitored in adolescents, as in adults, to control increases in blood pressure and pulse rate. Absent the many large-scale studies necessary to confirm the safety and effectiveness of pharmacological treatment of obesity in adolescents, Berkowitz et al. advise that “medications for weight loss should be used only on an experimental basis in adolescents and children.”

Because maintenance—keeping pounds lost off over time—is an issue for adults and children, Denise E. Wilfley et al. examine in “Efficacy of Maintenance Treatment Approaches for Childhood Overweight” (Journal of the American Medical Association, vol. 298, no. 14, October 10, 2007) how effectively children and parents who completed a five-month weight-loss program and lost an average of 11% of their bodyweight maintained their weight loss. Children who received the most intensive follow-up, which included socializing with more physically active peers, learning how to cope with teasing, and improving their body image, fared the best in terms of maintaining weight loss; however, at the one- and two-year follow-up, many had regained the weight they had lost.

**Educating Parents**

Researchers agree that primary prevention is the strategy with the greatest potential for reversing the alarming rise in overweight and obesity among children and teens. Public health educators recommend counseling parents and caregivers about healthy eating habits for children. They advise offering children a variety of healthy foods, in reasonable quantities, to assist children to make wise food choices. Children should be encouraged, but not forced, to sample new foods and should not be pressured to clean their plates. No foods or food groups should be entirely off-limits, or children may become fixated on obtaining the forbidden foods.

Even though it is difficult to impress children with the future health risks associated with excess weight,
parents should be informed that obese children are more likely to suffer from diabetes, heart, and joint
diseases such as osteoarthritis, as well as breast and colon cancer. Adults should model healthy habits,
consuming no more that \(30\%\) of calories from fat, exercising regularly, and limiting time spent in front of the
Television. Health educators are especially eager to reduce children's television viewing, with its destructive
blend of junk-food advertising and enforced inactivity. Finally, health professionals caution that food should
not be used to punish or reward behavior or as a way to comfort or console children. The undivided
attention of a parent or caregiver or an expression of sympathy, reassurance, or encouragement may
satisfy a child's need better than an ice cream cone or an order of French fries.

In “Factors Associated with Parental Readiness to Make Changes for Overweight Children” (*Pediatrics*, vol.
116, no. 1, July 2005), Kyung E. Rhee et al. find that parents are not always receptive to making lifestyle
changes that could help their overweight children lose weight—particularly if the parents do not see their
child's weight as a health issue. A study of 151 parents found that \(44\%\) of parents of children who were
overweight or obese did not see their child’s weight as a problem and as a result were not planning on
instituting lifestyle changes soon. Another \(17\%\) of parents did recognize that their child had a problem and
were considering making behavioral or lifestyle changes, but not soon. Rhee et al. find that parents of
children who were eight years old or older were more likely to be ready to address their child's weight issue
than parents of younger children. The same was true of parents who believed their child's weight was a
health issue; they were nearly ten times more likely than other parents to say they were ready to take
actions such as increasing their children's fruit and vegetable consumption, limiting television time, and
encouraging exercise. Parents were also more open to change if they viewed themselves as overweight.

**Eating Disorders**

Overweight and obesity are among the most stigmatizing and least socially acceptable conditions in
childhood and adolescence. Society, culture, and the media send children powerful messages about body
weight and shape ideals. For girls these include the “thin ideal” and encouragement to diet and exercise.
Messages to boys emphasize a muscular body and pressure to body build and even use potentially harmful
dietary supplements and steroids. Gender has not been identified as a specific risk factor for obesity in
children, but the pressure placed on girls to be thin may put them at a greater risk for developing eating-
disordered behaviors. Even though society presents boys with a wider range of acceptable body images,
they are also at risk for developing disordered eating and body image disturbances.

Adolescence is a developmental period marked by great physical change, and it is a time when many teens
subject themselves to painful scrutiny. Uneven growth, puberty, and sexual maturation may make teens feel
awkward and self-conscious about their bodies. Teenaged girls are especially susceptible to developing
negative body images—ignoring other qualities and focusing exclusively on appearance to measure their
self-worth. This single-minded, and often distorted, destructive focus can result in lowered self-esteem and
increased risk for mental health problems, including eating disorders.

**Who Is at Risk?**

Even though there are biological, genetic, and familial factors that predispose to eating disorders such as
anorexia nervosa (intense fear of becoming fat even when dangerously underweight) and bulimia (recurrent
episodes of binge eating followed by purging to prevent weight gain), the emergence of these disorders is
triggered by environmental factors. Chief among the environmental triggers is body image. Many researchers and health professionals believe that teenaged girls who identify with the idealized body images projected throughout American culture are at an increased risk for eating disorders.

Other risk factors are peer group pressures and sociocultural forces such as the fashion and entertainment industries and the media. The National Eating Disorders Association identifies media definitions of beauty, attractiveness, and health as among the myriad factors contributing to the rise of eating disorders. In the landmark survey *The Commonwealth Fund Survey of the Health of Adolescent Girls* (November 1997, http://www.commonwealthfund.org/usr_doc/Schoen_adolescentgirls.pdf?section=4039), Cathy Schoen et al. find that the media are girls' primary source of information about women's health issues. In another study, E. O. Guillen and Susan I. Barr of the University of British Columbia report in “Nutrition, Dieting, and Fitness Messages in a Magazine for Adolescent Women, 1970–1990” (*Journal of Adolescent Health*, vol. 15, no. 6, September 1994) that in the course of twenty years three-quarters of articles about fitness or exercise plans in one teen adolescent magazine named “to become more attractive” as the reason to start exercising, and 51% cited the need to lose weight or burn calories.

Historically, most adolescents with eating disorders have been first- or second-born white females from middle- to upper-class families. Girls who suffer from anorexia are often academically successful, with athletic prowess or training in dance. They tend to be perfectionists, well behaved, emotionally dependent, socially anxious, and intent on receiving approval from others. Adolescent girls with bulimia are generally more extroverted and socially involved. In “Statistics and Study Findings” (2008, http://www.eatingdisorderscoalition.org/reports/statistics.html), the Eating Disorders Coalition for Research, Policy, and Action notes that in the early twenty-first century the occurrence of eating disorders is increasing among younger children and throughout diverse ethnic and sociocultural groups.

The National Eating Disorders Association notes in “Statistics: Eating Disorders and Their Precursors” (2006, http://www.nationaleatingdisorders.org/p.asp?WebPage_ID=286&Profile_ID=41138) that a preoccupation with thinness and dieting begins at an early age. One study reports that 42% of first- to third-grade girls said they wanted to be thinner, and another finds that 81% of ten-year-olds feared becoming fat. Between 30% and 40% of middle school girls are worried about their weight, and 40% to 60% of high school girls diet. A survey of female college students finds that 91% had attempted to control their weight by dieting, and 22% said they were “often” or “always” dieting.

### Which Variables Are Associated with Dieting, Overweight, and Eating Disorders?

Dianne Neumark-Sztainer and Peter J. Hannan of the University of Minnesota at Minneapolis analyzed a representative sample of 6,728 adolescents in grades five through twelve who completed the Commonwealth Fund survey about the health of adolescent girls and boys. The results of the research were detailed in “Weight-Related Behaviors among Adolescent Girls and Boys: Results from a National Survey” (*Archives of Pediatrics and Adolescent Medicine*, vol. 154, no. 6, June 2000). The research aimed to assess the prevalence of dieting and disordered eating among adolescents; the sociodemographic, psychosocial, and behavioral variables that were associated with dieting and disordered eating; and whether adolescents report having discussed weight-related issues with their health-care providers. (Neumark-Sztainer and Hannan defined disordered eating as weight-related behaviors such as anorexia and bulimia nervosa, self-induced vomiting, binge eating, inappropriate or extreme dieting, and obesity.)
Subjects were assessed by calculating their BMI and eliciting weight-related attitudes and behaviors. For example, dieting was assessed by asking questions such as “Have you ever been on a diet?” and “Why were you dieting?” Behaviors were assessed by posing a question such as “Have you ever binged and purged (which is when you eat a lot of food and then make yourself throw up, vomit, or take something that makes you have diarrhea) or not?” Subjects were also asked “Right now, how would you describe yourself?” to gain an understanding of their perceptions of their weight. Psychosocial and behavioral variables including self-esteem, stress, depression, substance use (of tobacco, alcohol, or illegal drugs), and level of physical activity were also measured and scored using standardized questionnaires and inventories.

Neumark-Sztainer and Hannan reveal that 24% of the population was overweight, with 45% of the girls and 20% of the boys reporting a history of dieting. Twenty percent (13% of girls and 7% of boys) of the population reported disordered eating, which was associated with a range of behavioral variables, including overweight, low self-esteem, depression, suicidal ideation (thoughts, intent, or plans to take one's own life), and substance use. Nearly half of the adolescents recalled discussions about nutrition with a health-care provider, but just 24% of girls and 15% of boys said they had discussed eating disorders with a health-care provider.

Younger girls (grades five through eight) were significantly less likely to engage in dieting and disordered eating than older girls (grades nine through twelve), and dieting was reported by 31.1% of the fifth-grade girls and increased to 62.1% among twelfth-grade girls. The prevalence of disordered eating was highest among Hispanic girls and lowest among non-Hispanic African-American girls, and the prevalence of dieting was highest among white non-Hispanic girls and lowest among non-Hispanic African-American girls. Neumark-Sztainer and Hannan observe that the prevalence rates of dieting behaviors were lowest among African-American girls, suggesting that African-American girls may experience lower levels of body dissatisfaction than white girls.

Alcohol and drug use were directly associated with dieting and disordered eating among girls and boys; however, the association between substance use and disordered eating was stronger than the association between substance use and dieting. Tobacco use was associated with dieting and disordered eating among girls, but not among boys.

Neumark-Sztainer and Hannan note that “about half of the youth reported that a health care provider had discussed nutrition and weight issues with them” and observe that even though the content of such discussions was unclear, “at least the youth remembered that these issues had been discussed.” They conclude that “the high rates of dieting and disordered eating behaviors, coupled with the high prevalence of obesity found in this and previous studies, indicate a clear need for interventions aimed at the primary and secondary prevention of weight-related disorders. The large scope of the problem and the complexity of the issues at hand indicate that there is a need for multiple interventions at the individual and familial level (e.g., within clinical practices), at the group level (e.g., within school settings), and at the community or larger societal level (e.g., changes in the physical and social environment).”

- Prevalence of overweight children and teens, selected years, 1971–2004
- Body mass index (BMI) percentiles for boys, ages 2–20
- The interpretation of body mass index (BMI) varies by age
- Weight status categories by BMI-for-age percentiles
• Prevalence of teenaged boys who are overweight by race/ethnicity, 1988–94 and 2003–04
• Prevalence of teenaged girls who are overweight by race/ethnicity, 1988–94 and 2003–04
• Percentage of high school students who were overweight, by state, in 2003 and 2005
• Percentage of students who ate five or more servings per day of fruits and vegetables during the past seven days, 2005
• Percentage of students who drank three or more glasses per day of milk during the past seven days, 2005
• Percentage of students who described themselves as slightly or very overweight, 2005
• Percentage of students trying to lose weight, 2005
• Percentage of students who exercised to lose or keep from gaining weight, 2005
• Percentage of students who ate less, counted calories, or chose foods low in fat to lose or keep from gaining weight, 2005
• Percentage of students who went without eating for 24 hours or more to lose or to keep from gaining weight, 2005
• Percentage of students who took diet pills, powders, or liquids without a doctor's advice to lose or keep from gaining weight, 2005
• Categories and sources of competitive foods in schools
• Types of competitive foods often or always available through any venue in schools, by school level and nutrition category
• Percentage of students who attended physical education classes one or more days per week, 2005
• Percentage of students who attended daily physical education classes, 2005
• Percentage of students who actually exercised or played sports more than 20 minutes during an average physical education class, 2005
• Percentage of students who were physically active for 60 minutes or more per day on five of the past seven days, 2005
• Percentage of students who had participated in at least 20 minutes of vigorous physical activity on three or more of seven days and/or at least 30 minutes of moderate physical activity on five or more of seven days, 2005
• Percentage of students who had no vigorous or moderate physical activity during the past seven days, 2005
• Percentage of students who watched three or more hours per day of TV on an average school day, 2005
• Blood pressure levels for the 90th and 95th percentiles of blood pressure for boys ages 1 to 17 years
• Blood pressure levels for the 90th and 95th percentiles of blood pressure for girls ages 1 to 17 years
• Classification of cholesterol levels in high-risk children and adolescents


Source Citation