

ISSUE PAPER

Childhood Obesity - Advancing Effective Prevention and Treatment: An Overview for Health Professionals



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EXECUTIVE SUMMARY

Obesity has been declared an epidemic in the United States (US). With dramatic increases between 1987 and 2000, there are now an estimated 45 million overweight or obese US adults – nearly 65% of the population – according to the Centers for Disease Control and Prevention (CDC), and the number is continuing to grow. Today, one in five adults are classified as obese. While one of the national health objectives for the year 2010 is to reduce the prevalence of obesity among US adults to less than 15%, research indicates that the situation is worsening rather than improving.

The number of overweight and obese youth also continues to rise despite efforts by government officials, academic researchers, industry, and the media to bring attention to and take action against this growing health concern. The percentage of children and adolescents who are overweight has more than doubled since the early 1970s. CDC reports that African American and Hispanic children and youth are disproportionately affected by this problem, with 21.5% and 21.8% respectively classified as overweight compared to 12.3% of non-Hispanic white children.¹ Today approximately nine million young people are considered overweight.¹

In the past the cause of overweight and obesity in individuals was often attributed primarily to genetic factors. However, genes have not changed over the last 10 to 20 years as obesity has rapidly increased. It is clear, therefore, that the current obesity epidemic is due to a complex interaction of factors including

behavioral choices and a variety of environmental influences, as well as genetic predisposition.

Maintaining a balance between energy intake and energy expenditure is a critical factor in regulating body weight. The majority of obesity-related academic research, government funding, media attention, and parental concern has focused on nutrition and dietary contributions to child and adolescent overweight. Experts in this area have considered the contributions of a variety of factors to pediatric overweight including: family meal patterns and food choices, food availability, portion control, fat intake, school food service, sugar beverages, and nutrition products. Physical activity and time engaged in sedentary behaviors are also key factors in the maintenance of energy balance. While physical activity provides numerous mental and physical benefits to health, the increase in sedentary behaviors, in particular television viewing, has resulted in a need for more careful scrutiny of the contributions of decreased physical activity and increased inactivity to the energy balance equation.

Obesity has become an increasingly important medical problem in children and adolescents. Among the most common conditions associated with primary childhood obesity are hypertension, type 2 diabetes mellitus, pulmonary complications (e.g., asthma, sleep apnea), growth acceleration, dyslipidemia, musculoskeletal problems, and psychosocial problems. Studies of cancer incidence show strong relationships between different cancers and obesity in adults, such as breast, endometrial, prostate, and colon. While the association between childhood obesity and cancer is less clear, the high probability that

“Every child deserves to be born well, to be physically fit, and to achieve self-responsibility for good health habits.”

- From Bright Futures Children's Health Charter

obese children will continue to be obese in their adult years places obese children at increased risk for cancer and other diseases later in life.

The significant rise in prevalence of overweight and obesity has far-reaching “cost” implications, both in economic and social terms. This condition places a great burden on the US health care system as a result of the increasing prevalence of associated diseases, straining economic resources, and affecting individual productivity. Overweight individuals, both adults and children, are at increased risk for conditions such as diabetes, heart disease, high blood pressure, asthma, and some cancers. Today, the estimated annual cost of obesity and overweight in the US is about \$117 billion, and accounts for an estimated 31% of the total direct costs of fifteen co-morbid diseases.^{2,3} In addition, overweight and obesity can result in significant psychosocial and emotional consequences, particularly in the pediatric population.

There is general agreement by experts that prevention of obesity is easier than treatment. In order to truly prevent child and adolescent overweight, healthful behaviors must be introduced, modeled, and reinforced early in childhood. Because adult treatments have been less than successful and because it is difficult to predict which overweight children and adolescents will develop complications or will remain obese into adulthood, all children would benefit from the implementation of population-based prevention approaches that hold the greatest promise for reducing the onset of obesity among children and adolescents. Current prevention efforts by health care professionals (HCPs) should focus primarily on anticipatory guidance with parents and children addressing knowledge, attitudes, values, and beliefs about both eating and activity behaviors. The influence and perception of hereditary factors in managing weight may also be a challenge and requires HCPs and parents to focus on building self-esteem, examining environmental factors, and addressing psychosocial issues.

Expert committee guidelines for the assessment and treatment of child and adolescent obesity were published in 1995.⁴ However, most HCPs today have received limited training in nutrition, physical activity, and overweight assessment. Consequently, the guidelines have not been consistently implemented by HCPs and efforts to address and prevent overweight in the pediatric population have met with limited success. A 2002 needs assessment of pediatricians, pediatric nurse practitioners, and dietitians showed that less than 20% of pediatricians were practicing even the most basic guideline for pediatric patients – the assessment of body mass index (BMI).⁵

Several intervention programs and research studies in the past five years have demonstrated that small changes in behavior can result in significant changes in weight prevalence in the pediatric population. These projects have run the gamut from addressing very specific behaviors such as television viewing to implementing a variety of behavior modification practices in all lifestyle areas within a family or community.

The purpose of this document is to present an overview of pediatric overweight and to discuss the many facets of this condition and possible solutions. Issues to be considered in this paper include current prevalence and trends, contributing factors, economic considerations, and treatment and prevention efforts. An overview of evaluated treatment programs and other available interventions and resources is presented. Finally, a summary of key issues regarding pediatric overweight is provided, including:

- ◆ support of social marketing and other communications efforts
- ◆ development of unique intervention programs for specific populations
- ◆ investigation of factors that determine and reinforce youth health behavioral choices
- ◆ application of appropriate technology to promote healthy weight
- ◆ support of the role of healthcare providers in primary prevention
- ◆ investigation of the role of physical activity in weight loss and maintenance
- ◆ recruitment and retention of participants into community and worksite programs
- ◆ investigation of social stigma and discrimination associated with overweight

It is hoped that further examination of these and other related issues will help to define short, medium and long-term actions in health care, community intervention, and communications that can effectively address this critical public health issue.

INTRODUCTION

Obesity has become the most prevalent nutritional disease in the United States (US). It has been characterized in a variety of ways but simply defined: it is a “chronic condition that develops when energy intake exceeds energy expenditure, resulting in excessive body weight.”⁶ Opinions concerning obesity have shifted in recent years with many experts recognizing obesity as a medical “disease” that, if left untreated, can result in serious co-morbidities and health consequences. Current medical and scientific evidence suggests that overweight and obesity result from the interaction of a variety of factors including: personal behaviors, aging, biological issues related to weight regulation, genetic predisposition, and sociocultural and environmental influences. It has also been documented that excessive dietary fat intake and low levels of physical activity, often associated with prosperous industrialized lifestyles, can result in an excess weight condition.⁷

The phrases obese, overweight, and at risk of overweight are defined and measured differently for adult and pediatric populations. (For the purposes of this paper, youth and pediatric populations will be defined as 2-20 years of age unless otherwise specified.) Body Mass Index (BMI) is the primary measurement for assessing weight. The calculation of BMI is based on an individual’s height and weight, and is a helpful, although not the only, indicator of obesity and overweight as well as underweight.⁸ BMI for children is age and gender specific. While the adult BMI definitions are fixed measures without regard for sex and age, the measurement of BMI in children and adolescents varies to accommodate age- and gender-specific changes

in growth patterns. BMI is determined using the following formulas:

English Formula for BMI =

$$[\text{Weight in pounds} \div \text{Height in inches} \div \text{Height in inches}] \times 703$$

Metric Formula for BMI =

$$\text{Weight in kilograms} \div [\text{Height in meters}]^2$$

BMI measures in children and youth are plotted on growth charts that enable health care professionals (HCPs) to determine the BMI-for-age percentile of the pediatric patient (see <http://www.cdc.gov/nchs/about/major/nhanes/growthcharts/charts.htm>, specifically, Set 2 Growth Charts, body mass index-for-age percentiles for boys and girls age 2 to 20). The Centers for Disease Control (CDC) utilizes specific BMI definitions to categorize weight in adults and youth⁹ as presented in **Table 1**.

Because of the stigma and discrimination often associated with an obesity diagnosis, the CDC and other federal government organizations avoid the phrase “obese” when categorizing children and adolescents, limiting the definitions to “underweight”, “normal weight”, “at risk of overweight”, and “overweight” as outlined in the table below.

The rise in the prevalence of obesity in children and adolescents in the US is one of the most alarming public

Table 1. Categorizing Weight in Adults and Youth

Category	Adults (21+ years)	Youth (2-20 years)
Underweight	BMI < 18.5	< 5 th BMI-for-age percentile
Normal weight	BMI ≥ 18.5 -24.9	BMI-for-age ≥ 5th percentile to < 85th percentile
At risk of overweight	Not Typically Used in Adults	BMI-for-age ≥ 85th percentile to < 95th percentile
Overweight	BMI ≥ 25-29.9	BMI-for-age ≥ 95th percentile
Obesity	BMI ≥ 30-39.9	Not Used in Youth
Extreme Obesity	BMI ≥ 40	Not Used in Youth

health issues facing the nation today. The purpose of this paper is to present an overview of current knowledge in pediatric overweight and discuss facets of this condition along with prevention and treatment solutions. Issues to be considered in this paper include current prevalence and trends, contributing factors, and economic considerations. In addition, an overview of evaluated programs and other available resources will be presented.

PREVALENCE AND TRENDS

The words “pandemic” and “epidemic” have been used to describe the recent dramatic upward trends in child, adolescent and adult overweight and obesity.^{10,11} For researchers and HCPs this epidemic is particularly challenging for several reasons including: 1) the simultaneous increase in obesity-associated diseases, 2) the clinical onset of those obesity-associated diseases at younger and younger ages, 3) and the lack of knowledge about how to “treat” the problem. In October 2002, the CDC released the most recent overweight and obesity data from the National Health and Nutrition Examination Survey (NHANES IV) conducted with children, adolescents and adults in the US. Using BMI as the primary reporting measure, **Table 2** provides a summary of the prevalence findings from this most recent survey.

Today approximately nine million young people are considered overweight.¹ CDC reports that African American and Hispanic children and youth are disproportionately affected by this problem, with 21.5% and 21.8% respectively classified as overweight compared to 12.3% of non-Hispanic white children. Non-Hispanic black

and Mexican-American adolescents experienced the greatest increase in prevalence between surveys undertaken in 1988-1994 and 1999-2000 – an increase of more than 10%.

Findings from the recent National Heart, Lung, and Blood Institute (NHLBI) Growth and Health Study (NGHS) conducted with a biracial sample of children found the prevalence of overweight at age nine was one-third higher in black girls (31%) versus white girls (22%).¹⁴ The study also found that the rates of overweight and obesity doubled in both groups over the 10 years between ages 9-10 years and 18-19 years. The NGHS study concluded that while parental socioeconomic status (SES) is associated inversely with childhood obesity among white children, among African-American and Hispanic populations, childhood obesity does not seem to be linked significantly with parental income and education. Further research is needed to determine how ethnicity, race, SES, and education should be considered in the development of population-specific interventions to address childhood overweight.

Results from a longitudinal study conducted in Bogalusa, Louisiana have documented secular increases in body weight in children over the last two decades. Begun in 1972, the Bogalusa Heart Study (BHS) is the longest and most detailed study of children in the world. The focus of the BHS is on understanding the early natural history of coronary artery disease and essential hypertension.¹⁵ An examination of 26,000 measurements of body weight in 11,000 BHS children showed that the secular increase in body weight was 0.2 kg per year.

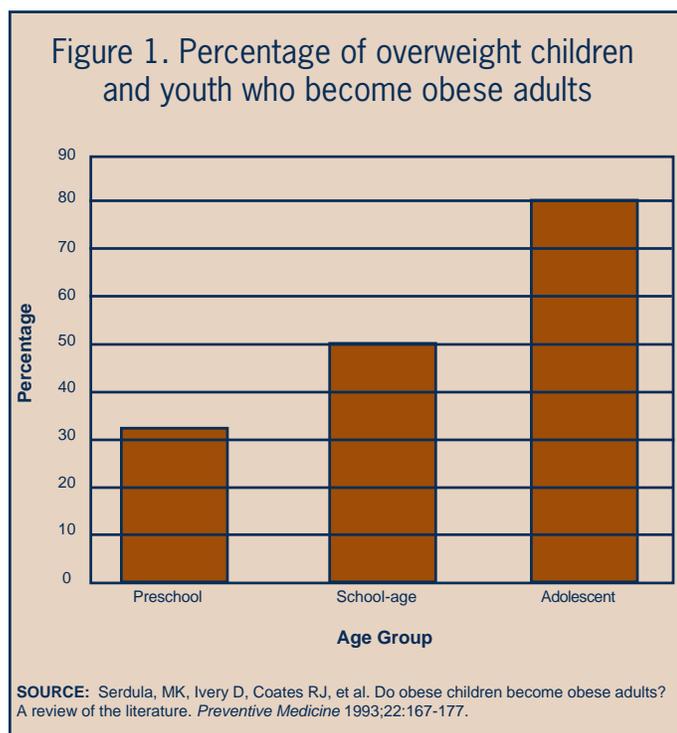
Concerns for children and adolescents experiencing rapid weight gain are enhanced by the research indicating that children are likely to carry obesity into adulthood and thus

Table 2. Prevalence and Trends in Overweight and Obesity in the US^{12,13}

MEASUREMENT	NHANES III (1988-1994)	NHANES IV (1999-2000)	Change In %
Adult Overweight	55.9%	64.5%	↑ 8.6%
Adult Obesity	22.9%	30.5%	↑ 7.6%
Adult Extreme Obesity	2.9%	4.7%	↑ 1.8%
2-5 Year Olds – Overweight*	7.2%	10.4%	↑ 3.2%
6-11 Year Olds – Overweight*	11.3%	15.3%	↑ 4.0%
12-19 Year Olds – Overweight*	10.5%	15.5%	↑ 5.0%

* Defined as: At or above the 95th percentile of the gender-specific BMI-for-age growth charts.

experience the health and social consequences of the disease at even earlier stages. There is cause for even greater concern when one considers that the degree of persistence of obesity into adulthood changes with the age at which the onset of obesity originally developed. Several studies have documented the persistence of obesity from childhood into adolescence and on to adulthood.^{16,17,18} As illustrated in **Figure 1**, the probability that overweight school-age children will become obese adults is estimated at 50% while the likelihood that obese adolescents will become obese adults is between 70 and 80%.



ETIOLOGIC FACTORS

Genetic and Familial Influences

Individuals often attribute their weight to genetics, and genes can and do influence an individual's predisposition to gain weight. However, single gene defects account for a small fraction of human obesity.¹⁹ Because genetically stable populations are also affected by the rising prevalence of overweight and obesity around the globe, this indicates that not only genetics but also behavioral and environmental factors are playing a critical role in the epidemic of childhood overweight.²⁰

Twin studies suggest that approximately 50% to 70% of the tendency toward obesity is inherited.²¹ Twin studies have also suggested that overweight represents the combined effects of genetic and environmental factors responsible for normal variation in weight in childhood.²² The specific interplay of genes and environment within the developing individual is not well defined. However, the increasing rate of obesity among genetically stable populations indicates that environment and some perinatal factors (e.g., bottle-feeding) are major contributors to the current epidemic of childhood obesity.

Familial influence is also an epidemiological consideration in regard to child weight. For example, if both parents are lean, the likelihood of a child becoming obese is just 9%.²³ When both parents are obese, the likelihood of the child also being obese rises to 60-80%.²³ More research, however, is needed in this area to document the effects of family behaviors on childhood and adolescent overweight.

Energy Balance

Maintaining a balance between energy intake and energy expenditure is a critical factor in regulating body weight. This regulation is very precise. For example, a positive balance of about 120 kcal per day (about one serving of a sugar-sweetened juice or soft drink) would produce a 50 kg increase in body mass over a 10-year period. Thus any factor that raises energy intake or decreases energy expenditure by even a small amount can have a long-term impact on the development of overweight and obesity.²⁴

Diet and Nutrition Factors

The majority of obesity-related academic research, government funding, media attention, and parental concern has focused on nutrition and dietary contributions to child and adolescent overweight. Experts in this area have considered the contributions of a variety of factors to pediatric overweight including: family meal patterns and food choices, food availability, portion control, fat intake, school food service, sugar beverages, and nutrition products qualifying under the Food Stamp and Supplemental Nutrition Program for Women, Infants, and Children (WIC) programs.

With the growing proportion of dual income families, greater use of technology, and more extracurricular options for children, family life has changed considerably over the past 20 years. In 1997, approximately 36% of food income was spent outside the home and that amount increased

to 38% in 1998.¹⁷ When meals are eaten outside the home, children consume more energy, likely due to the large portion sizes provided in most eating establishments.²⁵ When families regularly sit down together for a shared dinner, nutritional quality improves (less saturated fat, less fried food, more fruits and vegetables)²⁶ and television viewing decreases.²⁷

Other changes have occurred with regard to food choices and portion sizes that may affect energy balance. Weight gain in children and adults can be attributed in part to the increasing availability of cheap and nutrient rich foods and expanding portion sizes available through fast food locations, restaurants, and grocery stores. Young and Nestle completed a recent comparison of current food portion sizes (for foods including pizza, hamburgers, soda, French fries, and pasta) to the same products when they were first released on the market.²⁸ In general, most marketplace portions were twice the standard serving sizes, and portions offered by fast-food chains often were two to five times larger than the original size. However, a review of national cross-sectional and longitudinal intake data completed by researchers at the Pennsylvania State University noted that in recent decades portion sizes remained remarkably similar for many foods. Meat portions were actually smaller in recent samples, but portions were increased for milk, bread, cereal, juice, and peanut butter.²⁹

Gillis et al. (2002) conducted a cross-sectional study of 181 children aged 4-16 years who were either overweight (BMI above 95th percentile for age and gender) or non-overweight (BMI below 75th percentile for age and gender) to determine the relationship between juvenile overweight, dietary energy and fat intake and physical activity.³⁰ They found that, when activity level was controlled for, overweight children and adolescents consumed more dietary energy and fat than non-overweight children and adolescents. The researchers concluded that juvenile overweight is more strongly related to total energy consumed and than to dietary fat or the type of dietary fat consumed.

Another critical area for examination in the energy balance equation is school food service and vending. On a daily basis, approximately seven million students utilize the National School Breakfast Program and an estimated 25 million students use the National School Lunch Program.³¹ Meals from these programs may represent more than half the daily caloric intake for participating children in both programs. As such, modifications to school nutrition services and lunch and breakfast content continues to be controversial as school districts rely on the food service departments as a critical profit center. A recent position paper on school nutrition³² noted that schools can play a

key role in reversing the trends in childhood obesity by implementing coordinated nutrition services and promoting policies that support comprehensive, sequential nutrition education programs. In addition, the paper also noted that the school environment can and should be a model for healthy food choices for students.

Physical Activity and Inactivity

Along with diet, physical activity is the other key factor in the maintenance of energy balance. Physical activity provides numerous mental and physical benefits to health, including reduction in the risk of premature mortality, cardiovascular diseases, hypertension, diabetes, depression, and cancers.³³ The greatest benefits of physical activity are gained from regular participation for at least 30 minutes per day, at least four to five times per week.³⁴ Unfortunately, the trend is for children to spend less and less time engaging in physical activity with US children spending approximately 75% of their waking hours being inactive.³⁵

The Surgeon General's report (1996) noted that nearly 50% of US children aged 12-21 years do not participate in vigorous activity on a regular basis.³⁴ Physical education (PE) recommendations for preadolescent children suggest participation in daily PE classes with moderate to vigorous physical activity offered for at least 50% of class time.³⁶ One recent study noted that children are falling far short of the recommended PE time. Third grade students (n=814) from 684 elementary schools participated in an average of 2.1 PE lessons per week of 33 minutes each, and experienced only 25 minutes per week of moderate to vigorous activity in school PE.³⁷ Less than 6% of children in the study had daily PE. This lack of physical activity due in part to decreased time spent in physical education and active recess not only increases the chance of childhood overweight, but it also decreases the overall physical fitness of children that can have important consequences for school performance. A recent large-scale analysis reported by the California Department of Education showed that the level of physical fitness attained by students was directly related to their performance on standardized achievement measures.³⁸

The concept of physical inactivity has also been identified as an important contributing factor in the development and maintenance of childhood overweight.³⁹ Attraction and availability of many sedentary activities including television (TV), video games, computers, and the World Wide Web have all greatly affected the amount of time children spend participating in sedentary behaviors. A study by the Kaiser Family Foundation showed that children watch an average

of 2.5 hours of TV per day, and one in five kids watch TV for five hours or more every day.³⁵

Dr. Tom Robinson at Stanford University has led the research examining the relationship between TV viewing and childhood overweight. In the late '90s, a randomized controlled school-based trial was conducted in third- and fourth-grade students in two public elementary schools.⁴⁰ The intervention school participants received an 18-lesson, 6-month classroom curriculum to promote reduction of TV, videotape, and video game use. The primary outcome measure was BMI. The intervention group experienced statistically significant decreases in BMI, waist circumference, triceps skinfold thickness, and decreases in children's reported TV viewing and meals eaten in front of the television. There were no significant differences between groups for changes in high-fat food intake, moderate-to-vigorous physical activity, and cardio-respiratory fitness. A second study examined the causal relationship between TV viewing and body fatness. The results of this randomized, controlled trial provides evidence that TV viewing contributes to increased body fatness and that reducing TV viewing is a promising method for preventing childhood obesity.⁴¹

The decrease in the number of children walking to and from school, the increased use of technology by children (computers, TV remotes, etc.), and concern about after school play in safe neighborhoods have all contributed to increased youth sedentary time. An analysis of the growth in obesity and the impact of technological changes by Lakdawalla and Philipson led to the conclusion that "...about one-third of the growth in weight [resulted from] expansions in the supply of food, and two-thirds to demand forces, such as reductions in the physical requirements of work at home or in the market."⁴²

The teaching of the "energy balance" concept to young children is a critical consideration in addressing the increasing prevalence and prevention of childhood and adolescent overweight. This is reinforced by one literature review that suggests that overweight among preschool children, as well as older children, may be associated less with increased energy intake and more with low physical activity.⁴³ Integrated classroom lessons and active examples in health, science, and math classes of 'balancing' food intake with physical activity are one way to begin to address the knowledge gap in children. However, as experts examine the many ways to address the intake and expenditure issues within the energy balance equation, the health risks and medical complications continue to rise in children and adolescents.

HEALTH AND ECONOMIC IMPACT

Health Impact

Obesity has become an increasingly important medical problem in children and adolescents. Among the most common conditions associated with primary childhood obesity are hypertension, type 2 diabetes mellitus, pulmonary complications (e.g., asthma, sleep apnea), growth acceleration, dyslipidemia, musculoskeletal problems, and psychosocial problems.²¹ Studies of cancer incidence show strong relationships between different cancers and obesity in adults, such as breast, endometrial, prostate, and colon.⁴⁴ While the association between childhood obesity and cancer is less clear, the high probability that obese children will continue to be obese in their adult years places obese children at an increased risk for cancer, or other diseases and related conditions, later in life.

Hypertension. Once considered rare, primary hypertension in children has become increasingly common in association with obesity and other risk factors, including a family history of hypertension and an ethnic predisposition to hypertensive disease.⁴⁵ Because obese children are at approximately a three-fold higher risk for hypertension than non-obese children, proper screening by health professionals is critical.⁴⁵

Type 2 diabetes. Although once virtually nonexistent in adolescents, the American Diabetes Association reports that type 2 diabetes now accounts for 8% to 45% of newly diagnosed cases of diabetes in children and adolescents, especially minority youth.⁴⁶ This increase in adolescent diabetes is almost completely attributable to childhood obesity, although hereditary and lifestyle factors influence individual risk.⁴⁷ While undiagnosed type 2 diabetes is common in adults, it is unknown how many cases of type 2 diabetes in children are undiagnosed. One challenge is that African American and Hispanic children with type 2 diabetes may be diagnosed incorrectly as having type 1.⁴⁸ The increasing onset of type 2 diabetes in children is particularly concerning given its association with other serious consequences, such as cardiovascular disease (CVD), stroke, limb amputations, kidney failure and blindness.²⁰

Pulmonary complications. Childhood obesity has been shown to be related to increases in childhood pulmonary complications such as sleep-disordered breathing (sleep apnea), exercise intolerance, and asthma.²⁰ Asthma and exercise intolerance can also have a compounding effect in childhood obesity by limiting physical activity and thus

causing further weight gain. Gennuso et al., for example, examined the relationship between obesity and asthma in a study involving 85 asthmatic and 86 non-asthmatic four to 16 year old minority children.⁴⁹ She reported that there was significantly more children with asthma (30.6%) who were very obese (\geq 95th BMI percentile) compared with controls (11.6%). Children with asthma were also found to be significantly more overweight than non-asthmatics. The difference in obesity between children with asthma and controls was significant for both sexes and across all age groups, although the severity of asthma was not related to obesity.

Abnormal growth acceleration. Obesity is the most common cause of abnormal growth acceleration in childhood. For example, Slyper reports that obesity in females is associated with an early onset of puberty and early menarche.⁵⁰ Puberty is now occurring earlier in females than in the past, and this may be related either directly or indirectly to the population increase in body weight. The effect of obesity on male pubertal maturation is more variable, and obesity can lead to both early and delayed puberty.

Psychosocial issues. A sample of 868 third graders was evaluated to determine the relationship between obesity and depression in preadolescent children.⁵¹ These researchers found that there was a modest relationship between obesity as measured by BMI and self-reported depressive symptoms for girls but not for boys. They also found that girls' concern about overweight highly associated with self-reports of depression. This study suggests that the relationship between depressive symptoms and BMI in preadolescent girls may result from an excess of overweight concerns. The same relationship between obesity and overweight concerns was not true for boys. Gortmaker and his colleagues have also noted that, compared to normal weight peers, young adult women who were overweight as adolescents were more likely to have fewer years of secondary schooling, were less likely to be married, had lower household incomes and higher poverty rates. Men who were overweight as adolescents were less likely to be married.⁵²

Musculoskeletal problems. Overweight has been found to be associated with increased incidence of slipped capital femoral epiphysis (SCFE), the most common hip disorder among young teenagers. SCFE happens when the cartilage plate (epiphysis) at the top of a child's thighbone (femur) slips out of place.⁵³ Because children who are obese have a greater likelihood of remaining obese as adults, they are also at increased risk for developing musculoskeletal disorders as they age into adulthood.⁵⁴

Economic Impact

Obesity, inactivity and poor diet have been identified as major contributors to morbidity in the US. The economic burden of obesity in the US is substantial, with estimates of the aggregate economic costs associated with specific obesity-related diseases accounting for 5.5% to 7.8% of all national health care expenditures.^{55,56} For example, using data on excess work-lost days, restricted activity, bed-days, and physician visits from 88,262 US citizens who participated in the 1988 National Health Information Survey (NHIS) and 80,261 who participated in the 1994 NHIS, Wolf and Colditz (1998) estimated that the total cost attributable to obesity (i.e., BMI>30) amounted to \$99.2 billion dollars in 1995.² Approximately \$51.64 billion of those dollars were direct medical costs. Adjusting for inflation using recent Consumer Price Index figures, the total cost of obesity in the US in 2002 dollars would be \$117.1 billion, with \$60.84 billion going to direct medical costs.

- ◆ Obesity was found to be associated with a 36% increase in inpatient and outpatient spending and a 77% increase in use of medications, compared with a 21% increase in inpatient and outpatient spending and a 28% increase in medications for current smokers.⁵⁷
- ◆ Long-term weight loss is associated with reduced medication and medication costs for diabetes and CVD. A relative weight loss of 10% or more is necessary to reduce the costs of medication for CVD and diabetes, and weight loss of at least 15% was needed to reduce initiation of new treatment for the two conditions. Over six years, the average annual cost for diabetes and CVD medication increased by 96% in subjects with weight loss less than 5%, and decreased by 8% with weight loss 15% or more.⁵⁸
- ◆ People with BMIs greater than 30, compared with BMIs under 25, have average annual health care costs increased by 105% for prescription drugs, 14% for outpatient services, 38% for inpatient services, and 36% for all medical care.⁵⁹
- ◆ The cost of obesity to US business in 1994 was estimated to total \$12.7 billion (equivalent to \$15.42 billion in 2002 dollars). This included \$2.6 billion as a result of mild obesity and \$10.1 billion due to moderate to severe obesity

(equivalent to \$3.16 billion and \$12.26 billion respectively in 2002 dollars).⁶⁰

- ◆ Health insurance expenditures represented 43% of all spending by US business on coronary heart disease, hypertension, type 2 diabetes, hypercholesterolemia, stroke, gallbladder disease, osteoarthritis of the knee, and endometrial cancer. In 1994, obesity-attributable business expenditures were \$2.4 billion for paid sick leave, \$1.8 billion for life insurance, and \$800 million for disability insurance (equivalent to \$2.91 billion, \$2.19 billion, and \$970 million respectively in inflation-adjusted 2002 dollars).⁶⁰
- ◆ In the 6-year period from 1988 to 1994 the number of physician visits related to obesity increased 88%. During that same period there was an estimated 50% increase in lost productivity, 36% increase in restricted activity, and 28% increase in number of bed-days. In 2002 dollars the estimated cost of lost productivity attributed to obesity is over \$4.6 billion.²
- ◆ The annual direct costs of lack of physical activity in 1995, defined conservatively as absence of leisure-time physical activity, were approximately \$24 billion dollars or 2.4% of the US health care expenditures, and these

costs were independent of those resulting from obesity. Healthcare costs for obesity (i.e., BMI > 30) were estimated to be approximately \$70 billion in 1995.⁶¹

In 1999, the American Obesity Association commissioned a cost study by the Lewin Group to examine the costs of fifteen health conditions that are considered to be co-morbidities of obesity.³ The prevalence rate of each co-morbid condition was estimated using data from the NHIS (1995) and NHANES III. The direct health cost in 1999 dollars was determined for each of the co-morbid diseases using published data. The percentage of the direct cost attributed to obesity of each disease was then determined from reviews of scientific literature or information from professional associations and was computed according to the percent of the costs. This method established the direct health care costs of obesity at \$102.2 billion in 1999, or 31% of the total direct cost of the fifteen co-morbid diseases. **Table 3** provides an itemization of the amount of direct costs of health care for fifteen diseases that are attributable to obesity.

Given the statistics below, the country can only expect the economic costs to get higher as the prevalence of overweight and obesity continues to rise in adults, adolescents and children. With estimates that obesity could affect two in five adults by 2025, these statistics reinforce the need for a greater focus on prevention of weight gain at an early age.⁶²

Table 3. Obesity Costs in Relation to the Co-Morbidities (1999 dollars in billions)

Disease	Direct Cost of Obesity	Direct Cost of Disease	Direct Cost of Obesity as a Percentage of Total Direct Cost of Disease
Arthritis	\$7.4	\$23.1	32%
Breast Cancer	\$2.1	\$10.2	21%
Heart Disease	\$30.6	\$101.8	30%
Colorectal Cancer	\$2.0	\$10.0	20%
Diabetes (Type 2)	\$20.5	\$47.2	43%
Endometrial Cancer	\$0.6	\$2.5	24%
ESRD	\$3.0	\$14.9	20%
Gallstones	\$3.5	\$7.7	45%
Hypertension	\$9.6	\$24.5	39%
Liver Disease	\$3.4	\$9.7	35%
Low Back Pain	\$3.5	\$19.2	18%
Renal Cell Cancer	\$0.5	\$1.6	31%
Obstructive Sleep Apnea	\$0.2	\$0.4	50%
Stroke	\$8.1	\$29.5	27%
Urinary Incontinence	\$7.6	\$29.2	26%
Total Direct Cost	\$102.2	\$331.4	31%

SOURCE: Lewin Group (2000)

PREVENTION

In order to truly prevent child and adolescent overweight, healthful behaviors must be introduced, modeled, and reinforced early in childhood. As noted, being overweight puts children and adolescents at increased risk of health, psychological, and social complications but few overweight youth currently exhibit these problems. Because adult treatments have been less than successful and because it is difficult to predict which overweight children and adolescents will develop complications or will remain obese into adulthood, it benefits all children to focus on implementing population-based prevention approaches that hold the greatest promise for reducing the onset of obesity among children and adolescents. These approaches allow health professionals in several environments to impact the general health of today's children while simultaneously gaining a clearer understanding of the many factors contributing to childhood obesity and how it may be prevented.

Reviews have demonstrated that prevention of obesity is easier than treatment.^{63,64} In addition, prevention interventions in the health care, school and community settings have proven effective in preventing childhood overweight.⁶⁵ Finally, national health policymakers have been urged to consider prevention as the primary target to respond to the increasing rates of overweight and obesity among children and adolescents.⁶⁶

Advantages of prevention include ⁶⁷ :

1. The ability to maintain optimal metabolic physiology (i.e., body weight regulation).
2. Applying prevention strategies at the population level. This option is more cost effective since treatment is typically targeted at the individual and is generally expensive and labor intensive.
3. Early counseling or behavior modification therapy can address the root cause(s) of eating and activity behaviors.
4. Secondary beneficial effects such as general disease risk reduction and preventive behaviors have limited or no harm to a child or adolescent.

Current prevention efforts by HCPs should focus primarily on anticipatory guidance with parents and children addressing knowledge, attitudes and beliefs about eating and activity behavior.^{44,68,69} The influence of hereditary factors in managing weight may also be a challenge and requires HCPs and parents to focus on building self-esteem and addressing psychosocial issues. Prevention research in this area has included examination of many issues including breastfeeding, adult and child roles in feeding behaviors, recognition of satiety signals, inclusion of varied and colorful foods in the diet, selection of low-fat snacks, regular physical activity, and reducing television viewing. The following is a review of prevention efforts to be considered in trying to achieve successful health behaviors in child and adolescent populations.

Breastfeeding

Several studies have examined the contributions of breastfeeding to prevention of childhood obesity. Certain reports indicate that bottle-fed infants seem to be more at risk of obesity later in life.^{70,71} In a recent review of 11 studies examining prevalence of overweight in children three years of age and older, eight studies demonstrated a lower risk of overweight in those who had been breast-fed.⁷²

In a longitudinal birth cohort study, Bergmann et al. examined the role of breastfeeding as a protective measure against childhood overweight and adiposity.⁷³ BMIs in the breast-fed and bottle-fed infants were very similar at birth. However, bottle-fed infants had significantly higher BMIs and thicker skinfolds at three months and six months than breast-fed children. And at six years, obesity prevalence in the bottle-fed children nearly tripled. Logistic regression analysis in this study revealed that bottle-feeding, maternal overweight (BMI \geq 27), maternal smoking during pregnancy, and low SES were risk factors for overweight and adiposity at six years of age. One might conclude from this information that encouraging breastfeeding could be of public health significance as specific measures are considered for preventing childhood obesity.

Nutrition and Physical Activity Behaviors

It is estimated that for every 20% of excess body weight, a child will need one and one-half years of weight maintenance to attain ideal body weight.⁷⁴ As such, early and appropriate intervention through modification of diet, activity, and sedentary behaviors is particularly valuable since there is considerable evidence that childhood eating

and exercise habits are more easily modified than adult habits.⁷⁵ Logical preventive measures would be to reinstate more frequent PE periods at all levels of youth education and to increase short periods of activity during recess and after school – particularly in young children. Regarding nutrition behavior, one strategy is to promote the choice of healthier foods by lowering prices relative to alternative food choices in schools. One study examined the impact of a 50% price reduction on fresh fruit and baby carrots in two school cafeterias. Price reductions resulted in a four-fold increase in fresh fruit sales and a two-fold increase in baby carrot sales.⁷⁶

Prevention of youth weight gain at the individual level is particularly important given results of a study conducted in 4,746 adolescents to assess weight-related concerns and behaviors and to compare these concerns and behaviors across sex and weight status.⁷⁷ The use of unhealthy and extreme weight control behaviors and binge eating were reported to be alarmingly high among overweight youth, particularly adolescent girls. Extreme weight control practices (taking diet pills, laxatives, or diuretics or vomiting) were reported by 18% of very overweight adolescent girls. The researchers concluded that more prevention interventions are needed that address the spectrum of weight-related disorders, enhance skill development for behavioral change, and provide support for dealing with potentially harmful social norms.

Sedentary Behaviors

Reducing the amount of sedentary behavior may substantially assist in the prevention of overweight or in an individual child's ability to grow into his/her weight. While several studies have examined elementary and middle school students, little research on television viewing and preschool-aged children has been conducted to date. Dennison et al. examined TV and video viewing habits of a diverse, low-income preschool population to determine if these behaviors relate to the children's adiposity. Participants included 2,761 adults with children, ages one to less than five years, involved in the WIC program. The relationship between the amounts of time a child spent viewing TV and videos and the presence of a TV set in the child's bedroom was compared with the prevalence of overweight (BMI >85th percentile) in the participants. TV and video viewing was higher among black and Hispanic children and viewing time increased with the child's age. Approximately 40% of children had a TV set in their bedroom. Children were more likely to be overweight and spent more time (almost five hours per week) watching TV/videos than children without a TV in their bedroom.⁷⁸ A related study examining whether TV viewing is linked to

patterns of snacking in young girls was conducted with 173 girls and their parents. The participants were assessed longitudinally at ages five, seven, and nine years old. Results highlight the fact that girls who watched more television consumed more snacks in front of the TV. Where one or both parents were overweight in a family, girls who watched more television snacked more frequently, and girls who snacked more frequently had higher intakes of fat from snacks.⁷⁹ Removing TV's from bedrooms and limiting TV viewing time may be preventive actions for parents to implement and for HCPs to recommend in an effort to modify eating and activity behaviors in children and adolescents.

Comprehensive Obesity Prevention Programs

HCPs typically focus behavior modification on prevention of weight gain or weight maintenance - especially in children who are at risk of overweight. The aim is to slow or halt weight gain so a pediatric patient will grow into his or her body weight over a period of months to years. Many nutrition- and activity-related behavioral strategies used with adults have been successfully applied to children and adolescents including: self-monitoring of behaviors; recording food intake and physical activity behaviors; slowing the rate of eating; limiting the amount, time and place of eating; and using rewards and incentives to encourage desirable behaviors. To achieve weight maintenance, HCPs often implement safe, sensible, and gradual alterations in parental and child buying habits, eating patterns, and activity levels.

Experts at Stanford University have made significant contributions to the research in the area of obesity prevention through the implementation of comprehensive health behavior interventions.

- ◆ The Stanford Adolescent Heart Health Program study focused on improving health behaviors in almost 1,500 tenth graders from four ethnically diverse high schools.⁸⁰ Improvements in aerobic physical activity, physical fitness, dietary fat, body fatness, and smoking were targeted by the intervention. Delivered in the classroom over 20 sessions, boys and girls in the experimental schools reported becoming regular aerobic exercisers and increasing their selection of low-fat, high-fiber foods. Improvements in physical fitness and body fatness substantiated the reported behaviors. The treatment group students also had decreases in BMI and skinfold thickness.

- ◆ Stanford researchers also created the “Obesity Prevention for Pre-Adolescents” program (OPPrA). Funded by the NHLBI, the program included approximately 1,000 diverse children in 13 public elementary schools. The three-year intervention, from the third grade through fifth grade, attempted to alter food preferences, reduce TV viewing, present health advocacy activities, and provide an intensive treatment program for high-risk (already overweight) children and their families. Over the course of the program, the intervention included: 5-A-Day nutrition information, parent newsletters, a new PE program, taste tests during lunch time, television viewing reduction curriculum, summer programs, reducing fast-food and junk food, and an optional weight control program for overweight children.

These prevention interventions demonstrate the need for comprehensive, age-appropriate programs that provide information and behavior change tools in a variety of formats and environments.

TREATMENT

Logically, for both children and adults, the best way to significantly affect the prevalence of obesity is not through treatment but prevention. However, experts have noted that the natural tendencies of children to move and be active and to know when they are satiated have been subverted early in life resulting in dysregulation of body weight.⁸¹ While prevention remains the key long-term strategy, the growth in the obesity epidemic among all populations makes it necessary to continue the examination of a variety of treatment options relative to individual and group intervention.

Medical Assessment and Treatment

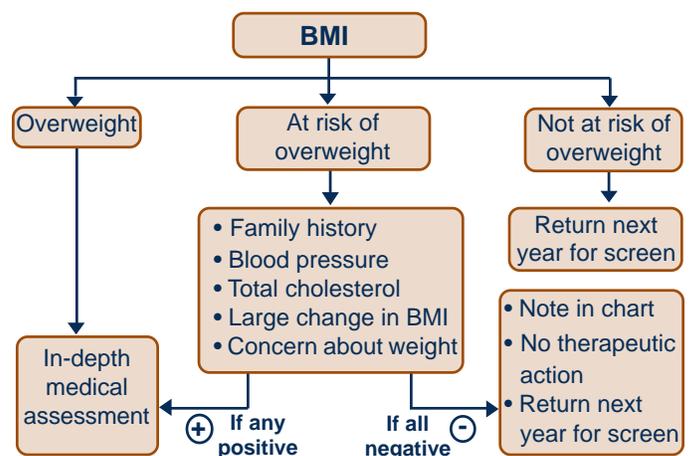
Although obesity-associated morbidities occur more frequently in adults, significant consequences of obesity as well as the antecedents of adult disease occur in obese children and adolescents.⁸² Because of the ever-increasing prevalence of childhood obesity, pediatric health care providers should now address overweight or risk of overweight in over 25% of their patients.⁴ The health benefits of obesity treatment are well established, but the many genetic and environmental factors that promote

obesity and the difficulty children and families experience when they attempt to change eating and activity behavior can make this problem almost overwhelming.

An important concern with child and adolescent obesity treatment is the lack of reimbursement to health care providers for related services. While there is a great need for weight management programs for overweight and obese children, the low reimbursement rates preclude the long-term financial feasibility of such programs without other support or a significant proportion of patients who can pay for the care “out-of-pocket.” One study of 191 children in a hospital weight management program noted that the median reimbursement rate was 11% with variations from 0% to 100%.⁸³ The reimbursement rates differed significantly among policy types and did not differ between boys and girls, white and black children, and degree of obesity. This issue has been reported in a variety of publications and continues to be a critical barrier to treatment of child and adolescent obesity.

Improvement in assessment of overweight is a critical need area. Some researchers have suggested the utilization of an algorithm or flow chart to improve assessment and screening of childhood and adolescent weight risk prior to implementing a care plan. The guidelines for overweight in adolescent preventive services, published in 1994, provide one such tool for consideration.⁸⁴ This algorithm has been adapted for use by the CDC in their on-line interactive growth charts training modules and illustrates a general screening process (see **Figure 2**). A more recent

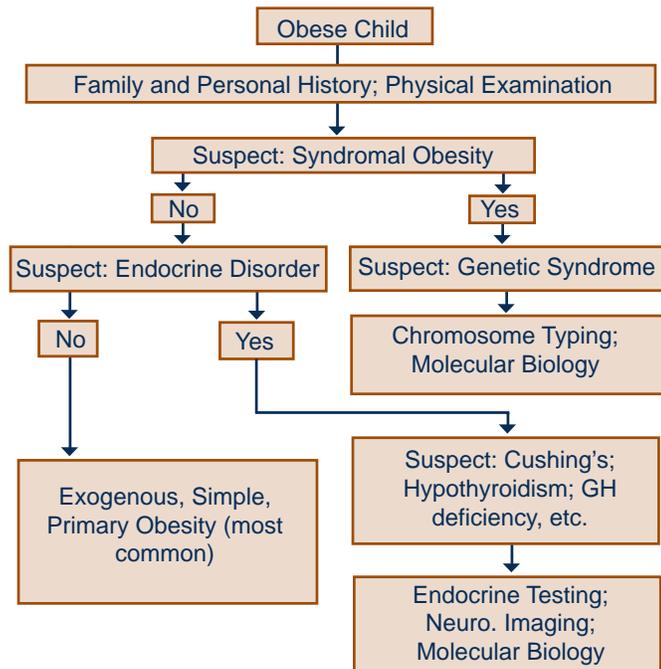
Figure 2: Recommended Overweight Screening Procedures



SOURCE: Himes JH, Dietz WH. Guidelines for overweight in adolescent preventive services: recommendations from expert committee. The Expert Committee on Clinical Guidelines for Overweight in Adolescent Preventive Services. *Am J Clin Nutr* 1994 Feb;59(2):307-16. © *Am J Clin Nutr* American Society for Clinical Nutritionists.

algorithm presented by Kiess et al. suggests a more clinical approach to the screening process (see **Figure 3**).²¹

Figure 3: Childhood Obesity: Diagnostic Algorithm



SOURCE: Kiess W, Galler A, Reich A, Müller G, Kapellen T, Deutscher J, Raile K, Kratzsch J. Clinical aspects of obesity in childhood and adolescence. *Obesity Reviews* Feb 2001;1:29-36.

Maintaining the delicate balance between energy intake and energy expenditure is becoming increasingly more difficult. The key strategies involve helping young children develop and maintain healthy dietary patterns, balanced by adequate daily physical activity.⁸⁵ Because overweight is associated with various risk factors even among young children, it is possible that the successful prevention and treatment of obesity in childhood could reduce the adult incidence of CVD.⁸⁶ Still, there is a paucity of information on the impact of childhood interventions on health in adulthood, yet it would be prudent to anticipate that early interventions will be effective.⁸⁷ The available treatment options to address weight include behavioral and medical concerns as described below.

Behavioral Treatment

Changes in health behaviors can lead to significant reductions in the prevalence of obesity and the burden of associated health consequences. Behavioral interventions

can be implemented at several different levels: individual (e.g., one-on-one or group exercise or nutrition counseling), interpersonal (e.g., advice or support groups), organizational (e.g., school-based or worksite programs), and societal (e.g., legislative or policy changes). As noted, the assessment of BMI and BMI percentile from age two and beyond can signal HCPs to address weight-to-height ratios early on during well child visits. This information can result in the most important treatment option – early, age-appropriate modifications of eating and activity behavior. Research has shown success in intensive group programs, however, this approach is not easily translated to an office visit. In the absence of well-established, office-based evaluation and treatment approaches, the Maternal and Child Health Bureau and National Center for Education in Maternal Child Health convened a committee of experts in childhood obesity to provide recommendations – a summary of which is provided in **Table 4**.⁴ These recommendations include emotional and behavioral evaluations that should precede efforts to control weight. The report also included treatment recommendations based on the interventions studied in successful comprehensive behavior programs, especially those developed by Dr. Leonard Epstein at the State University of New York at Buffalo (SUNY Buffalo; see page 16).

While the threats to health related to childhood and adolescent obesity are increasingly being reported in the medical literature, the prevention and treatment of childhood obesity are often considered to be the responsibility of individual children and their parents.⁸⁸ Although powerful social and cultural forces drive the pandemic of excess weight, HCPs can help to counteract these trends by educating patients and parents about the serious health risks of obesity and prescribing concrete interventions, such as regular physical activity and healthier food choices. Once identified as “at risk” or “overweight”, pediatric patients are often referred to programs that address three areas: nutrition, activity, and environmental (home, school, etc.) concerns. Robinson and others^{1,89} suggest that the most effective behavioral treatment programs have certain components that result in successful, long-term weight loss:

- ◆ Parent involvement including parent education about critical behavior areas;
- ◆ Frequent meetings or sessions;
- ◆ Sustained treatment duration;
- ◆ Group format with individual behavior counseling;
- ◆ A simple diet that produces a calorie deficit;
- ◆ A physical activity intervention that allows for personal choice;

- ◆ Emphasis on reducing sedentary behavior;
- ◆ Home and family environmental change that increases cues for physical activity and reduces cues for calorie intake and inactivity;
- ◆ Self-monitoring, goal setting, and behavior contracts; and
- ◆ Education regarding skills for behavior maintenance and relapse prevention.

Table 4. Obesity Evaluation and Treatment: Expert Committee Recommendations

RECOMMENDED ACTION	DETAILS
IDENTIFY	<ul style="list-style-type: none"> ◆ Calculate BMI ◆ Patient with BMI \geq 95th percentile should undergo medical assessment
ASSESS	<ul style="list-style-type: none"> ◆ Genetic or endocrinologic causes ◆ Medical complications ◆ Assess degree of overweight ◆ Determine if referral to specialist is necessary
EVALUATE	<ul style="list-style-type: none"> ◆ Readiness to change ◆ Physical activity history ◆ Diet history
SET GOALS	<ul style="list-style-type: none"> ◆ Behavioral ◆ Medical ◆ Weight
THERAPY - GENERAL APPROACH IN FAMILY	<ul style="list-style-type: none"> ◆ Early intervention ◆ Must be ready to change ◆ Educate about medical complications ◆ Involve whole family and caregivers ◆ Goal - permanent change through small, gradual steps ◆ Monitor eating and activity ◆ Encouragement/empathy from health professionals
THERAPY - SPECIFIC CONSIDERATIONS	<ul style="list-style-type: none"> ◆ Parenting skills <ul style="list-style-type: none"> • Praise behavior • No food as reward • Establish meal and snack times • Parents provide healthy options, children decide • Be a role model and consistent ◆ Increasing physical activity levels <ul style="list-style-type: none"> • Reduce sedentary behavior ◆ Decreasing caloric intake <ul style="list-style-type: none"> • Food Guide Pyramid • Stoplight Diet™ ◆ Eliminate tobacco use

The above components can produce long-term weight management in up to one-third of pediatric participants.⁸⁹ A discussion of weight management programs is presented later in this paper.

Another concept tested by Faith et al. in a randomized, two-arm study design examined the effects of contingent TV on physical activity and TV viewing in 10 obese children. For participants in the experimental group, TV viewing was contingent upon pedaling a stationary cycle ergometer. The 12-week study (including a two-week baseline period) found that the intervention significantly increased pedaling and reduced TV viewing time in obese children. The experimental group pedaled an average of 64 minutes per week, compared with 8.3 minutes in control participants. The experimental group watched an average of 1.6 hours of TV per week, compared with 21.0 hours per week on average by controls. The experimental group also showed greater reductions in total body fat and percent leg fat.⁹⁰ This study demonstrates that 'treatment' of overweight may come in the form of contingencies in the home environment to modify physical activity and TV viewing.

Surgical and Pharmacological Treatment

Little conclusive research regarding surgical and pharmacological treatment of child and adolescent obesity is available. These treatment options are typically used only with severely obese adolescents where other risk factors are present. Most HCPs consider these options a "last resort," particularly in younger adolescent pediatric patients, and surgical procedures and drugs used as treatments for adult obesity are still typically not recommended for children and adolescents.²¹ Nonetheless, both surgery and drug treatments are reported to be in use with pediatric populations with severe obesity.

In 1975, researchers reported on 18 morbidly obese adolescents and young adults (age less than 20 years) who underwent either gastric bypass or gastroplasty. In this study, the median weight loss was approximately 25% of body weight by three years after surgery.⁹¹ A later study in 1980 described 30 adolescents and young adults, under 20 years of age who underwent gastric bypass or gastroplasty. Average weight loss was approximately 40 kg at three years and 26 kg at five years after surgery.⁹²

However, recent advances in the technique of bariatric surgery may allow larger, more sustained weight loss. In a recent long-term follow-up study of 10 severely obese adolescents undergoing gastric bypass, surgery provided

satisfactory weight loss in nine of ten subjects.^{93,94} Long-term data demonstrated that the majority of these adolescents maintained their weight loss for as long as 10 years. Average weight loss was in excess of 50 kg, which represented approximately 59% of the initial excessive weight. Weight loss in these adolescents significantly improved both severe sleep apnea and hypertension.

In reviewing a 20-year database (1981 to 2001) on bariatric surgery, Sugeran et al. identified 33 adolescent patients, ages 12-18 years, who had been treated surgically.⁹⁵ Standard gastric bypass was the most common surgery (17 patients) followed by long-limb gastric bypass (10 patients). Five to ten years post-surgery, five patients had regained all or most of the weight, while the remaining patients maintained significant weight loss for up to 14 years after surgery. This review determined that surgery in adolescents is safe and is associated with significant weight loss as well as correction of co-morbid conditions and improved self-image and socialization.

Strauss (2002) points out that, as in adults, a multidisciplinary team with medical, surgical, nutritional, and psychological expertise should select adolescents who are candidates for gastric bypass carefully.⁶⁷ All severely obese children greater than 100% above ideal body weight should first be provided the opportunity to lose weight through a family-based dietary and behavioral program as recommended by the Expert Committee on Obesity Evaluation and Treatment.⁴ Gastric bypass surgery should only be considered for well-informed and motivated adolescents who have failed previous attempts at weight loss in diet and behavior modification programs. Extensive counseling, education, and support are required both before and after gastric bypass. Adolescents undergoing gastric bypass require lifelong medical and nutritional surveillance after surgery, especially during pregnancy.

Obesity pharmacotherapy trials in pediatric patients have been cited as far back as 1965 with early research examining the effects of phentermine (see below for product description) compared to a placebo prescription. However, the research regarding this treatment option is minimal due to the stigma, risks, and costs associated with such studies in young children and youth. The available drugs currently being researched include:

- ◆ **Phentermine:** An appetite suppressant for short-term treatment (up to 12 weeks duration).
- ◆ **Meridia®** (sibutramine hydrochloride monohydrate): A neurotransmitter uptake

inhibitor that works by manipulating the appetite-control centers in the brain. This drug has caused significant elevation in blood pressure (BP) in some people.

- ◆ **Xenical®:** Also called “orlistat,” this drug works in the gastrointestinal track to block the body’s absorption of dietary fat. Orlistat also diminishes the absorption of fat-soluble vitamins so daily vitamin supplements must be taken.
- ◆ **Phenylpropanolamine (Acutrim® and Dexatrim®):** Available without a prescription, this drug works by increasing the level of a nervous system chemical called catecholamine that increases metabolic rate. Use of this product can also increase heart rate, BP, and glucose levels.
- ◆ **Leptin and leptin receptors:** Leptin is a hormone produced primarily in adipose tissue that can alter hunger and energy homeostasis.

Clinical trials with sibutramine, orlistat, and leptin are currently underway at several academic institutions around the US. Because severely obese children have a higher risk of becoming obese adults⁹⁶ and suffering health complications earlier in adulthood, additional research is needed regarding the safety and proper utilization of surgery and drug therapy in treating obese adolescents.

PROGRAMS AND INTERVENTIONS

The information and statistics presented in this paper clearly demonstrate the need for additional intervention research and program development regarding prevention of overweight, weight loss maintenance, and/or weight regain prevention in children and adolescents. Childhood obesity treatment recommendations from an expert committee suggest that the degree of obesity and the existence of obesity-related complications determine the type of intervention to be utilized.⁴ For example, treatment in an overweight child with no complications might include reinforcement of physical activity behaviors and encouragement of healthier eating, while a pediatric patient with medical complications might require more intense therapy including special diets, pharmaceutical treatments, and possibly even surgery in extreme cases.

A variety of programs have been implemented to address childhood overweight. The primary sites for pediatric weight management intervention research have been schools and health clinics. There are several youth-oriented studies that have produced significant long-term results.^{97,98} The program characteristics are similar within the studies: dietary modifications, increased exercise, and behavior modification. Behavior modification efforts can include self-monitoring, goal setting, behavior reinforcement, and personal or environmental cues as prompts to induce behavior change.⁹⁹ Additional components of the most effective programs appear to include reduced intake of high energy density foods, reductions in physical inactivity, and parental involvement.^{2,100} **Table 5** presents an overview of several programs followed by a more detailed narrative based on the environment in which they are implemented. In addition, a resource list highlighting a number of programs is provided in **Attachment A**, page 30.

Health Care Setting

The use of formal weight loss programs in health care settings has increased in recent years. Several academic institutions in conjunction with their associated medical school or health system have implemented and evaluated child and adolescent weight management programs including: Baylor College of Medicine, Louisiana State University, Stanford University, SUNY Buffalo, University of Alabama at Birmingham, and the University of Cincinnati. A limited number of these programs are available for purchase by other practitioners as comprehensive programs, packages, or toolkits.

The advantages of clinical weight loss interventions delivered in the academic/health care setting have been the ability to utilize a “team” of experts from different areas for the treatment program and the ability of researchers to follow patients over an extended period of time. Disadvantages have tended to be associated with low enrollment and reach, high cost, and high drop-out rates.^{101,102} Dr. Leonard Epstein (SUNY Buffalo) is considered a leader in the study of pediatric and family weight management through behavior modification and has published longitudinal data (5-10 years post-intervention) demonstrating sustained weight loss in the pediatric population.^{103,104,105,106} Key findings from the work of Epstein and others^{107,108} indicate that:

- ◆ Most youth weight loss programs result in sustained weight loss.

Table 5: Overview of Weight Management, Physical Activity & Nutrition Intervention Programs

Program	Environment	Intervention Time	Behavior Modification	Physical Activity	Nutrition
KidShape®	Health Care Team-based program for families	8 week program (two 4-week modules)	X	X	X
SHAPEDOWN™	Health Care Family-based	10 weekly session; 2.5 hours each	X	X	X
Committed to Kids®	Health Care Individual outpatient & group	4 phases; each 10 weeks in length	X	X	X
SUNY Buffalo Childhood Weight Control Program	Health Care Individual & group program	1.5 hour sessions, 6-month (weekly for 8 weeks, bi-weekly, & then monthly) 1-on-1 counseling, group education sessions	X	X	X
HealthWorks!™	Health Care - Team-based program for families	Intensive 12 week phase with monthly follow-up	X	X	X
L.E.S.T.E.R.®	Health Care - Team-based program for families	8 week program (2 individual sessions, 6 group sessions)	X	X	X
Healthy Start	Preschool, 2-5 years	Comprehensive health curriculum, nutrition focus		X	X
TAKE 10!®	School K – 5th grade	Implemented in general classroom	X	X	X
CATCH™	School K – 5th grade	Implemented through PE, Health & general classroom	X	X	X
Pathways™	School - 3rd – 5th grade, American Indian children	Implemented in general classroom	X	X	X
SPARK®	School - Pre- K through MS	Implemented through PE classes	X	X	X
Planet Health®	School 6th – 8th grade	Implemented through PE/Health classes	X	X	X
SlimKids™	Community	10 week healthy eating program	X	X	X
Colorado on the Move™	Community / Church / Worksite	14 week, self-monitored step program		X	
10,000 Steps® Program	Community / Worksite	8 weeks		X	

- ◆ The range of weight loss demonstrated in studies varies greatly within individual patients.
- ◆ Longer treatment programs result in greater weight loss.
- ◆ The role of parents may be more influential in modifying younger children's behavior (versus adolescent behavior).^{106,109}
- ◆ Programs utilizing behavior modification (versus education only) resulted in a greater change in weight status.¹¹⁰
- ◆ The caloric intake in most childhood treatment programs ranged from 900 to 1500 kilocalories daily depending on severity and the presence of medical complications.

The following interventions delivered in the clinical setting have demonstrated effectiveness and weight loss.

KidShape®

The mission of KidShape is to increase awareness and promote adoption of a healthy lifestyle, including healthy eating, physical activity participation, and building positive self-esteem for entire families with overweight or obese children. Established in 1987 by a pediatric endocrinologist, the program attempts to meet the needs of diverse families by creating a supportive environment. The program objectives are to:

- ◆ Increase awareness of and adoption of healthy eating habits.
- ◆ Increase awareness of and participation in regular physical activity (to minimum of three times a week for 30 minutes).
- ◆ Increase awareness of and self-appreciation of positive aspects of each participant.
- ◆ Set realistic goals and be rewarded for achieving them within the family.

KidShape is currently licensing two separate interventions: KidShape and KinderShape. The programs can be licensed to organizations that can demonstrate the presence of a registered dietitian (RD), a mental health professional (MHP), a physical activity instructor (PA), and a site coordinator. A two-day training is required through the KidShape Foundation. While no evaluation data has been published at this time, the website reports that in a recent study, 87% of KidShape program participants had demonstrated weight loss and 80% of those participants kept it off for at least two years.¹¹¹

KidShape, for ages 6-14, is an eight-week program divided into two interdependent four-week modules in both English and Spanish. The first four-week module is entitled "Fruit Session" and the second four-week session is entitled "Vegetable Session." Two consecutive four-week modules must be completed for a family to graduate. KinderShape (ages 3-5 years) is a six-week program that is suitable for delivery to parents and daycare workers. A family must complete five out of six modules in order to graduate. Classes presented include: nutrition for families and adults, active play for students, behavior modification for adults, cooking demonstrations, arts and crafts, and family physical activity. Contact information: KidShape, 8733 Beverly Blvd, Suite 400, Los Angeles 90048, phone: 888-600-6444, e-mail: info@kidshape.com, Web: www.kidshape.com.

SHAPEDOWN™

Developed by the University of California, San Francisco, SHAPEDOWN¹¹² is a family-based intervention that has shown to be effective at 10-year follow-up. Individuals participate in educational meetings designed to enhance self-esteem and peer relationships while adopting healthier habits considering genetic and environmental influences. The basic program is delivered in four age groups (6-8, 9-10, 11-12 and 13-18) and involves 10 weekly sessions of 2 1/2 hours each delivered by a SHAPEDOWN provider and a co-instructor. Weight loss is gradual – ranging from weight maintenance to no more than one pound per week loss. The program integrates cultural, economic, and ethnic differences into its materials with workbooks that include examples of a broad range of family types. The SHAPEDOWN program is licensed to qualified health care systems and all workbooks and parent guides are available for order online at \$19 each. Contact information: SHAPEDOWN, 1323 San Anselmo Avenue, San Anselmo, CA 94960, phone: 415-453-8886, e-mail: shapedown@aol.com, Web: www.shapedown.com.

Committed to Kids®

Established in 1986, the Committed To Kids (CTK) Pediatric Weight Management Program is an individualized approach to weight management conducted in an outpatient, group setting.^{113,114,115} Developed by the Louisiana State University Medical Center Department of Pediatrics, the program uses a team-based approach including a physician, registered dietitian, exercise physiologist, and behavior specialist. The program is delivered over one year and has four phases depending on the severity of the child's overweight. CTK participants

receive a comprehensive physical, exercise, and nutritional evaluation prior to starting the program. The exercise component, called “MPEP” (Moderate Intensity Progressive Exercise Program), includes aerobic, strength, and flexibility training presented through videos and educational materials. Each phase includes a 10-week exercise prescription and record-keeping cards as well as an exercise video appropriate to the participant’s phase. As progress is made, participants are advanced to the next phase, using the color-coded exercise prescription cards, videos and appropriate dietary modifications. Children and families also attend weekly, group meetings that include educational sessions, behavioral discussions, and activities to reinforce behavior change.

The CTK program has been thoroughly evaluated (more than 15 published articles) and the program materials and tool kits are available for order online. A significant decrease in body weight, body fat and BMI has been found in 62.5% individuals who completed the one-year program. A short-term success rate (10-20 weeks) of 95% and a one-year success rate of 70-75% have been cited in other published research.¹¹⁶ A new book, *TRIM KIDS™: The Proven 12-Week Plan That Has Helped Thousands of Children Achieve a Healthier Weight*¹¹⁷, has been released based on the implementation and evaluation research conducted on the CTK program. The cost for the CTK procedures kit is approximately \$295 and the *Trim Kids* book is available on line for \$19-\$25. Contact information: Committed to Kids, 248 Aris Avenue, Metairie, LA 70005. No phone or e-mail address is provided. Web: www.committed-to-kids.com/home.html.

SUNY Buffalo Childhood Weight Control Program

The SUNY Buffalo Childhood Weight Control Program is a six-month program, and typically implemented two times per year. Participants attend weekly 1 1/2 hour sessions for eight weeks, then bi-weekly sessions for eight weeks, and finally monthly sessions. The program includes individual counseling and group education sessions that focus on behavioral choice theory. This program, like CTK, has been extensively evaluated and participants have achieved sustained weight loss and reduced sedentary behavior primarily through use of non-food incentives (e.g., family outings).

The SUNY Buffalo program utilizes the Stoplight Diet to help decrease the intake of energy dense foods in younger children (6-12 years).¹¹⁸ The Stoplight Diet categorizes foods (similar to the Food Guide Pyramid) and then codes the foods into three-color categories: green or GO foods, yellow or CAUTION foods, and red or STOP foods. Green foods can be eaten any time (typically fruits and vegetables

that don’t exceed 20 calories), yellow foods are eaten with limitations and have average nutritional values for their food category, and foods in the STOP or red category are high fat or energy dense foods. In a four-month, family-based weight management program with children, eight to 12 years old, who were monitored at 10 years post-intervention, 34% of participants had maintained a decreased weight of more than 20%. Contact information: Colleen Kilanowski, Program Coordinator, SUNY Buffalo, G-56 Farber Hall, South Campus, phone: 716-829-3400, e-mail: ckk@buffalo.edu.

HealthWorks!™

The HealthWorks! intervention for overweight children ages five to 10 years and adolescents ages 11 to 19 years is part of the Heart Center at Cincinnati Children’s Hospital Medical Center. HealthWorks! participants must meet specific weight criteria and be referred to the program by a physician. The program uses a team-based treatment approach including: a physician, a registered dietician, a psychologist, a nurse, an exercise physiologist, an exercise instructor, the child and the family. Similar to other programs, the HealthWorks! initiative requires a comprehensive health screening and includes a variety of components:

- ◆ Diet modification and individual nutrition counseling
- ◆ Lifestyle physical activity promotion and group exercise sessions (offered by age group)
- ◆ Behavioral intervention strategies
- ◆ Parental involvement
- ◆ Comprehensive clinical evaluation (pre-, during and post-screen)
- ◆ Group education for adult family members

Prior to development of an individualized treatment plan, participants and family members are required to attend a “Tools That Promote Progress” group session. The session, led by a psychologist, reviews the behavioral management components of the program. There is an intensive 12-week “initial phase” followed by ongoing treatment and follow up on a monthly basis with reassessment after every six months in the program. A manuscript highlighting program results is in review but it was noted that the majority of participants who completed the initial 12-week phase had a reduction in BMI. Contact information: HealthWorks! 3333 Burnet Avenue, Cincinnati, OH 45229-3139, phone: 513-636-4305, Web: www.cincinnatichildrens.org/svc/prog/healthworks/default.htm.

L.E.S.T.E.R.[®] (Let's Eat Smart Then Exercise Right)

The LESTER program of the University of Alabama at Birmingham (UAB) Department of Clinical Nutrition is for children ages six to 11 years. This eight-week program consists of two individual and six group sessions with follow-up at six and 12 months. The treatment team includes a clinical nutritionist, a child life therapist, and family members. The LESTER program components include: an instructor's manual, parent and child notebooks, board games, and 12 monthly follow-up newsletters. Nutrition and physical activity education is provided on topics such as: the Food Guide Pyramid, LESTER food groups (a variation of the Stoplight Diet), fast food and dining out, school lunch, exercise and lifestyle activities, and tips for behavior change. Behavior goals are established and food and activity records are provided to enhance self-monitoring. Family education is provided on effective communication, building self-esteem, and scheduling activities and meals with the children. Family responsibilities are clearly outlined: remove high calorie, high fat foods from the home; provide structured meals and snack times; and initiate change in the whole family (not just the overweight child).

One unique aspect of the LESTER program is a scholarship fund that has been established by the UAB Children's Auxiliary to help reduce the expense of the program, charged at \$330.95, to participating families. The reimbursement rate of third party payers varies from 30-100% based on 2002 available data. In an unpublished study of 26 LESTER participants at post-intervention, weight loss results were positive. Within the 26 participants, at initial screening, 22 were obese and four were overweight. At the 4 1/2 year follow-up, 18 were obese, five were overweight, and three had attained a normal weight. Additionally, at baseline 15.4% of the 26 participants had a BMI less than the 95th percentile compared to 19.2% post-intervention, and 30.8% at the 4 1/2 year follow-up.¹¹⁹ Contact information: Sue Teske, MS, RD, The Children's Hospital of Alabama, e-mail: susan.teske@chsus.org.

School Setting

The school environment provides an ideal setting in which to develop and test health behavior interventions due to the "captive audience" of students, teachers, and administrators. Much has been written in the media and scientific literature about the need for modification of the school environment, including policy changes to promote healthier dietary intake and more opportunities for physical activity.¹²⁰ Past research has demonstrated the link

between a child's health and his or her ability to learn but few studies have examined the combination of a healthful diet and activity behaviors on academic performance.^{121,122} There are number of evaluated school intervention programs available addressing the topics of childhood obesity prevention and physical activity and nutrition behaviors. These tools may provide health care systems the opportunity to reach out to local or regional school districts to serve as partners in education to promote a healthy school environment. A select few school and government programs are reviewed in this section.

Healthy Start

One of the few evaluated comprehensive preschool health curriculum, Healthy Start (HS), was developed through a National Institutes of Health (NIH) grant to Dr. Christine Williams, a pediatrician at Columbia University. The aim of HS is to examine primary prevention of cardiovascular risk factors in preschool children. The initial preschool program uses two primary interventions: 1) a food service program designed to reduce total fat in preschool meals and snacks to less than 30% of calories and reduce the saturated fat to less than 10% of calories, and 2) a comprehensive preschool health education curriculum, focused heavily on nutrition.¹²³ Recently published results from an HS intervention in 2-5 year olds in nine Head Start centers indicate the program was successful in reducing consumption of saturated fat in school meals over two years, compared with an increase in control schools. In addition, a significant decrease in saturated fat and total fat content in menus/meals occurred at intervention preschools compared with controls without compromising energy intake or intake of essential nutrients.¹²⁴ The HS materials are available for order online (at <http://www.healthy-start.com/order.htm>) and include a teacher's guide, classroom activities, parent materials, music tape, and 12 posters for \$170 plus S&H. Contact information: Healthy-Start, LLC, PO Box 115, Huntington, NY 11743, phone: 631-549-0010, e-mail: info@healthy-start.com, Web: www.healthy-start.com.

TAKE 10![®]

Developed by the International Life Sciences Institute Center for Health Promotion (ILSI CHP), TAKE 10! is unique in that it is a classroom-based curriculum tool that integrates at least 10 minutes of moderate-to-vigorous physical activity with grade-specific academic learning objectives to reinforce required concepts and skills. The combination of auditory, visual, and movement stimulation in the lessons appeals to multiple learning styles and the

lessons require little teacher preparation. The materials kit includes activity cards and student worksheets (sorted by curriculum content areas in language arts, math, social studies, science and general health); teacher resources; classroom posters and stickers (to track activities and reward students); teacher video; and evaluation tools. Four manuscripts are currently in preparation examining outcomes in: teacher implementation patterns, energy expenditure, students' attraction to physical activity, and student time on tasks in classrooms using TAKE 10!. Energy expenditure levels were assessed in first-, third- and fifth- grade students participating in TAKE 10! activities.¹²⁵ Students achieved moderate-to-vigorous physical activity levels; and the recorded steps-per-session ranged from 644 to 1041. Teachers report implementation of the program in their daily routines with almost half of teachers implementing the program at least four times per week.¹²⁶ The TAKE 10! materials are available for purchase on-line at \$79.00 per grade kit. Contact information: ILSI CHP, 2295 Parklake Drive, Suite 450, Atlanta, GA 30345, phone: 770-934-1010, e-mail: take10@ilsi.org, Web: www.take10.net.

A Coordinated Approach To Child Health: CATCH™

Originally called the "Child and Adolescent Trial for Cardiovascular Health," development of the school-based CATCH intervention was funded through an NIH grant. The CATCH intervention, for grades three to five, was designed to: increase physical activity; decrease fat, saturated fat, and sodium in children's diets; and prevent tobacco use. Tools and materials were developed to improve PE, school food service, and grade-specific health education programming. With an initial pilot from 1987-1991 in eight schools, CATCH was one of the first trials to integrate school, child and family components in an ethnically diverse population. The larger trial conducted in 96 schools from 1991-1994 took place in four geographic areas of the US: California, Louisiana, Minnesota, and Texas. Tracking of CATCH participants was completed in 500 schools between 1994 and 1997. As part of the intervention, 4,019 children from four states and representing multiple ethnic groups were assessed for selected risk factors at baseline and after 2 1/2 years of intervention.¹²⁷ Common protocols were used for both examinations at the four sites. Compared with the control group, changes in the intervention group with regard to obesity, blood pressure, and serum lipids were not statistically significant. Total cholesterol decreased by 1.3 mg/dl over time in the intervention group and by 0.9 mg/dl in the control group.¹²⁷ Materials for grades kindergarten to fifth were developed and disseminated between 1998 and 2001 to more than 700 schools, predominantly in Texas.¹²⁸ A follow-up study

was completed with CATCH participants in 56 intervention and 40 control elementary schools. Intervention group results include: less self-reported daily energy intake from fat (30.6% vs. 31.6%); significantly higher self-reported daily vigorous activity; and higher dietary knowledge and dietary intentions. No significant differences were noted among BMI, blood pressure, or serum lipid and cholesterol levels.¹⁷ The CATCH materials can be purchased as a set or by individual component from Flaghouse, Inc. Contact information: Flaghouse, Inc., 601 FlagHouse Drive, Hasbrouck Heights, NJ 07604-3116, phone: 800-793-7900 or 201-288-7600, e-mail: sales@flaghouse.com, Web: www.flaghouse.com.

Pathways™

The Pathways intervention is a multi-center school-based intervention to reduce obesity in American Indian children coordinated by the University of North Carolina. The program fosters healthy eating practices and increases physical activity in elementary school children (grades 3 through 5) on six American Indian reservations around the US. With funding from the National Heart, Lung and Blood Institute, a three-year feasibility study was conducted from 1993-1996. In phase two, a full-scale five-year study (1996-2001) was conducted and the program expanded to include 41 additional American Indian reservation schools. The Pathways program encourages understanding among children about different tribal cultures and the materials contain educational information for children, families, food service staff, PE and classroom teachers, and other essential school staff. Family fun nights are held at each school including dancing, non-competitive physical activities, and taste tests of low-fat foods. Family involvement is maintained throughout the intervention with take-home "snack packs," "action packs," and "challenge sheets." To extend the reach of the program, grandparents and tribal elders are encouraged to share information with the children about traditional games and other physical activities and traditional tribal foods. The primary outcome measure of the Pathways study is percent body fat. Secondary outcome measures include: physical activity levels; nutrient intake; knowledge, attitudes, and behaviors related to food and physical activity; and process evaluation. Journal articles providing an overview of Pathways study outcomes are expected in the near future, but the data is likely to reinforce the need for age-appropriate, culturally-specific interventions in young children.¹²⁹ Contact information: University of Minnesota, School of Public Health, Division of Epidemiology, 1300 South Second Street, Suite 300, Minneapolis, MN 55454-1015, Web: <http://hsc.unm.edu/pathways>.

The SPARK® Programs (Sports, Play and Active Recreation in Kids)

The SPARK program was developed by San Diego State University to improve the quality of PE. The original research evaluated a PE program for fourth- and fifth-grade students designed to increase physical activity during PE classes and outside of school. One of the few formal and evaluated PE curricula available, the program includes instructional materials for use by both PE and non-PE teachers. The program components include PE materials and a lifelong wellness tool that helps address physical activity and nutrition behaviors on an individual basis. Results demonstrated that students spent more minutes per week being physically active in PE specialist-led (40 min) and teacher-led (33 min) PE classes than in control classes. Girls in the specialist-led condition performed better in tests of abdominal strength and endurance after two years. No improvement in physical activity outside of school was demonstrated.¹³⁰ Sallis et al. examined the effects of SPARK on academic achievement in a subsequent study of 759 children.¹³¹ Children completed the Metropolitan Achievement Tests before and after participation in the SPARK program. The major finding in this study was that SPARK-trained teachers, who devoted twice as many minutes per week to PE as control teachers, did not experience a decline in student academic achievement. In fact, trained teacher results were superior to control teachers on language, reading, and basic battery. The SPARK programs now encompass materials for pre-school through middle school children and are available for purchase. Contact information: The SPARK Programs, 438 Camino Del Rio South, Suite 110, San Diego, CA 92108, phone: 800-SPARK PE, fax: 619-293-7992, e-mail: spark@sparkpe.org.

Planet Health®

Harvard University researchers, with funding from the NIH, developed a school-based health behavior intervention for 6th-8th grade students called Planet Health. The program was thoroughly evaluated via a randomized, controlled field trial in five intervention and five control schools beginning in fall 1995 and ending in spring 1997. Planet Health sessions were integrated into middle school classroom curricula by teachers in four major academic subjects and PE. Lessons focused on decreasing television viewing, decreasing consumption of high-fat foods, increasing fruit and vegetable intake, and increasing moderate and vigorous physical activity. The study results demonstrated a reduction in obesity prevalence among girls, but not among boys; reduced television viewing among girls and boys; and increased fruit and vegetable consumption

among girls.¹³² The program is available for sale for approximately \$40 through Human Kinetics. Contact information: Human Kinetics, P.O. Box 5076, Champaign, Illinois 61825-5076, phone: 800-747-4457, fax: 217-351-1549, e-mail: orders@hkusa.com, Web: www.humankinetics.com.

Community Setting

Community-based approaches to weight management can include interventions in worksites and homes (via correspondence or technology), as well as multi-modal community programs in a variety of regional locations. While these programs allow large numbers of overweight persons (primarily adults), many who might not seek assistance otherwise, to receive treatment or other approaches to improve health behaviors at lower costs than clinical interventions, they have been shown to produce only modest weight loss.¹³³ The advances in technology, including the large increase in the number and use of home-based computers and personal email, are showing promise as useful tools for modifying behavior within community-based and family-based weight loss programs.

In past research, adults have expressed a strong preference for self-help education formats over group activities, as well as assistance in evaluating food habits, education regarding behavior modification techniques for weight control, and information about the health consequences of being overweight.¹³⁴ However, little information is available about the preferences of children and adolescents relative to the format and delivery of community-based weight loss or obesity prevention programs. This is an area of research that deserves further study including examining the recruitment and retention of participants into community and worksite programs, longer-term interventions to examine sustained weight loss, and the inclusion of families in community-based and worksite-based weight loss programs.^{25,135} This section provides a brief review of community-based programs aimed at adults and/or children as well as a listing of some electronic resources accessible on the World Wide Web.

SlimKids™

The SlimKids program is a ten-week (or more) healthy eating program designed to help children and teens lose weight easily and safely. Laura Kraemer, a former overweight teenager and licensed health care professional, developed the program in 1995. SlimKids includes foods from the five basic food groups and closely follows the

USDA dietary guideline recommendations. The daily average caloric intake while on the program is 1500-1800 calories. The program emphasizes health education, long-term lifestyle changes, enjoyable activity, moderate eating, self-acceptance, a positive approach, and focuses on three factors: diet, activity, and habit. A family package contains an illustrated program book including menus, recipes, after school and fast food solutions, an illustrated folder, ten weeks of daily journals, and unlimited e-mail support for one year. There has been no published evaluation data on the SlimKids program, but in the period between 1995 and 1999 Ms. Kraemer notes, "...generally 70% of kids and teens who were over 11 years of age lost between 8-18 pounds. In the under 11 years age group, 75% of the kids lost between 3-12 pounds in a ten-week period."¹³⁶ Participants are encouraged to return for free weight checks in six months and 12 months. The materials are available for a price of \$24.95 at <http://www.slimkids.com/>

Colorado on the Move™

Colorado on the Move (COM) is statewide lifestyle program designed to improve health and quality of life by increasing walking as measured by the number of steps taken each day. Program participants use step counters to establish a baseline number of steps. Once a participant knows their average steps per day, they are encouraged to work up to an additional 2000 more steps every day—an amount sufficient to eradicate weight gain in more than 90% of the Colorado population. The program provides lots of tips for increasing steps as part of daily lifestyle behavior. The program has been running statewide since Governor Bill Owens launched it on October 3, 2002. Several initial evaluation studies have been conducted in different settings. These are typically 14 weeks in duration and follow a specific format: establish baseline number and then walk for weeks 1-4 adding steps each day; recalculate baseline number and then walk for weeks 5-9, trying to improve the number of daily steps taken; recalculate baseline number and then walk for weeks 10-14. If individuals are physically unable to walk or if they engage in other physical activities, they can receive step credit by using the step conversion chart available on the COM website. Preliminary results from the program indicate that participants in schools, worksites, and communities are able to increase steps by 2000 per day (about a mile) over the 14-week period of measurement.¹³⁷ Participation rates are high—some worksites report greater than 80% participation. Over 100,000 step counters have been distributed in Colorado since February of 2002. Ongoing activities include studies of success characteristics, sustainability and long-term outcomes. A follow-up

statewide step survey among a representative sample of the population will be conducted in 2005 to indicate progress against the baseline statewide step survey conducted in 2002. Contact information: Colorado on the Move, Helen Thompson, MA, RD, Program and Research Liaison, e-mail: helen.thompson@uchsc.edu, Web: www.coloradoonthemove.org.

10,000 Steps® Program

The 10,000 Steps program was developed in 1998 to promote and assist people in becoming more physically active by increasing their daily steps (via walking or running). Developed by HealthPartners, a large managed-care organization in Minnesota, the pilot study of the 10,000 Steps program was conducted on 92 of its "inactive" members. In this intervention, each registered member received a pedometer, a personal action planner, a log, and biweekly motivational cards for the first eight weeks. A conversion chart is available to help adjust step totals for different activities. Bi-monthly mailings were sent for the following six months. At the completion of the first eight weeks, 47% of participants completed a telephone survey. On surveys, 81% report that the program has assisted them in increasing their physical activity.¹³⁸ HealthPartners now offers both on-line and hard copy versions of the 10,000 Steps program. The cost for either program is \$20 for HealthPartners members and \$30 for nonmembers. Contact information: 10,000 Steps, phone: 952-883-7800, Web: www.healthpartners.com or www.10k-steps.com.

Web-based Resources

Are You Ready For Weight Loss? - University of Texas Southwestern Medical Center at Dallas
http://www.swmed.edu/naa/quizzes/wt_loss_quiz.htm

Summary: An interactive Web site questionnaire that examines your motivations for weight loss and helps you decide if you are ready to make healthy lifestyle changes.

BAM! Body and Mind
<http://www.bam.gov/>

Summary: Presented by the CDC, BAM! was created to answer kids' questions on health issues and recommend ways to make their bodies and minds healthier, stronger, and safer. The site also has information for teachers, providing them with interactive activities to support their health and science curriculums that are educational and fun.

Cyberkitchen - Shape Up America<http://www.shapeup.org/kitchen/index.htm>

Summary: Cyberkitchen demonstrates how to balance the food consumed with physical activity. Also provides a way to achieve and maintain a healthy weight through interactive assessment, meal planning, and recipes.

Interactive Healthy Eating Index - Center for Nutrition Policy and Promotion (CNPP)<http://147.208.9.133/>

Summary: A free dietary assessment tool that allows you to keep up to a 20-day food log. This tool analyzes your diet on a daily and cumulative basis, provides information about your total nutrient intake, how your own food intake stacks up against the food guide pyramid, and gives the user a healthy eating index score and ideas about how to improve his or her diet.

Kidnetic<http://www.kidnetic.com/>

Summary: An advertisement-free, interactive website for 9-13 year olds and their families that communicates healthy eating and active living information in meaningful and relevant ways to help the viewers achieve a balance of health behaviors.

Nutrition Analysis Tool (NAT) Energy Calculator - University of Illinois-Urbana/ Champlain<http://www.nat.uiuc.edu/energy/>

Summary: A free web-based program that allows anyone to determine the amount of physical activity needed to lose weight. The three function energy calculator allows you to choose from a variety of activities, times, and desired calorie loss and suggests ways to reasonably accomplish your goals.

Smart-Mouth.org<http://www.cspinet.org/smartmouth/>

Summary: An informational nutrition web site for children developed as part of a comprehensive strategy by the nonprofit Center for Science in the Public Interest to help address childhood obesity and other diet-related health problems.

USDA Nutrient Database for Standard Reference - USDA Nutrient Data Laboratoryhttp://www.nal.usda.gov/fnic/cgi-bin/nut_search.pl

Summary: A database of over 6,000 foods that allows you to search one food at a time for a detailed nutrition analysis of that particular food.

VERB™ It's what you do.

Two Web sites: <http://www.verbnow.com/> and <http://www.verbparents.com/>

Summary: The CDC has created the VERB campaign to get 'tweens, nine to 13 years old, moving and having fun. It is a multi-media campaign utilizing population-specific messages to encourage social and physical activity.

KEY ISSUES AND FUTURE DIRECTIONS

Because of the multiple factors underlying the rapid increase in child and adolescent overweight, a combination of weight loss treatment, weight gain prevention, and other health promotion strategies employed simultaneously is likely to yield the greatest public health benefits. Many key issues need to be addressed in order to define and implement effective strategies for this critical health problem. Among the most important areas for future research and intervention efforts for child and adolescent overweight are the following:

- ◆ Support of social marketing and other communications initiatives that build awareness, educate populations about the risk factors, and promote behavior modification.
- ◆ Develop unique intervention programs for specific populations in a variety of environments that use various behavior modification approaches to improve nutrition, physical activity, and sedentary behaviors.
- ◆ Investigate factors that determine and reinforce youth health behavior choices.
- ◆ Apply appropriate technology to promote healthy weight in children and adolescents, including the expanded use of physical activity assessment tools, telephone, computer, personal digital assistants, and Internet communications channels.

- ◆ Define and support the role of HCPs in primary prevention education with pediatric patients including training to more effectively address language preferences, literacy issues, assessing readiness to change, cultural issues, and managing family conflict around weight.
- ◆ Investigate to clarify the type, intensity, and duration of physical activity that will produce long-term weight loss, improve adherence, and increase enjoyment of exercise in children and youth.
- ◆ Examine the recruitment and retention of participants into community and worksite programs, and the inclusion of all family members in community-based and worksite-based weight loss programs.
- ◆ Investigate ways to identify and reduce social stigma and discrimination associated with overweight and obesity.

The high, and growing, incidence and prevalence of childhood overweight and obesity indicate that effective strategies for both primary and secondary prevention must be developed. The significant health and economic consequences of this epidemic, when coupled with the complexity of the issues surrounding the problem, highlight the need for coordinated actions by people and organizations from many sectors of society. As Hill (2002) points out, "The problem of obesity will be addressed successfully only when partnerships are formed that link efforts among individuals, organizations working in health care, schools, and the community."¹³⁹

While there is a need for a national plan to respond to the obesity epidemic, the immediate need for action to find effective interventions should not be ignored. Generating awareness and motivating action in the health care setting may be the most readily achievable approach, since health care professionals are increasingly encountering overweight children in their daily practices. The principle determinants of future success will likely lie in finding effective ways to build broad-based partnerships and develop unique strategies to combat the problem. With clear evidence that obesity produces health problems and increases health costs, continued research to define successful intervention methods is vital.

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General Overview of Physical Activity and Nutrition Intervention Programs*				
Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
Healthy Start	Pre-K 3 & 4 yrs	<p>Change nutrition patterns in preschool centers.</p> <p>Evaluate the effect of nutrition education and food service intervention on blood cholesterol and fat intake in 3- and 4-year-old children.</p>	<ul style="list-style-type: none"> • Significant decrease in blood cholesterol levels • Saturated fat intake in the children gradually decreased over time • Increased nutrition and health knowledge • Decreased fat and saturated fat content of the preschool meals and snacks 	<p>http://www.healthy-start.com</p> <p>Christine L. Williams Professor of Clinical Pediatrics Dir, Children's Cardiovascular Health Ctr Columbia University, Babies & Children's Hospital, BHN7-702 3959 Broadway New York, NY 10032 Phone: 212-305-7815 Fax: 212-305-8995 E-mail: chrisw@pol.net</p> <p>Cost: \$135.00 plus S&H</p>
Animal Trackers Pre-School TAKE 10!® Intervention	Pre-K 3-5 yrs	<p>Increase amount of structured physical activity in preschool children.</p> <p>Enhance/encourage gross motor development: marching, jumping, throwing, kicking, hopping, etc.</p> <p>Provide an easy-to-implement physical activity program integrated with preschool content areas.</p>	<p>Evaluated in three states (NH, NY, GA) in demographically different populations.</p> <p>Currently collecting data on fourth round of pilot testing in NM.</p>	<p>David Dennison Program Manager Physical Activity & Nutrition (PAN) ILSI Center for Health Promotion 2295 Parklake Drive Suite 450 Atlanta, GA 30345 Phone: 770-934-1010 Fax: 770-934-7126 Email: ddennison@ilsi.org</p>
Hip-Hop to Health Jr.	Pre-K 3-5 years	<p>Test the effect of the intervention on change in body mass index.</p> <p>Alter the trajectory toward overweight/obesity among preschool African-American and Latino children.</p> <p>Report baseline data from an obesity prevention intervention developed for minority preschool children.</p>	<p>5-year randomized intervention (ongoing) in 24 Head Start Programs.</p> <p>Efficacy of the intervention will be determined by weight change for the children and parent/caretaker.</p> <p>Behavior related to diet and physical activity are established early in life and modeled by family members.</p> <p>Early intervention efforts addressing the child and family are needed to prevent obesity later in life.</p>	<p>Marian L. Fitzgibbon Ph.D Eating Disorders Research Program 710 N. Lake Shore Dr. Suite 1200 Chicago, IL 60611 Fax: 312-908-5070 E-mail: mfl056@northwestern.edu</p>

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
<p>The SPARK Programs (Sports, Play, and Active Recreation for Kids)</p> <p>After School (AS) - Active Recreation</p>	<p>1. Grades 3-6</p> <p>2. K-2</p> <p>3. Pre-K</p> <p>4. MS (6-8)</p> <p>5. AS, 5-14 years</p> <p>6. Lifelong Wellness (formerly Self-Mgmt.)</p>	<p>Improve the extent to which PE/PA/nutrition contributes to achieving US health objectives</p> <p>Provide teacher training to enhance PE/PA/nutrition in schools</p>	<ul style="list-style-type: none"> • Doubled student physical activity during PE classes • Improved the quality of teaching; main-tained for at least 1.5 yrs after the study • Improved sports and activity skills • Improved cardiorespiratory fitness and muscular endurance in girls • Improved academic achievement • Students enjoyed the SPARK PE classes 	<p>Paul Rosengard Executive Director The SPARK Programs 438 Camino Del Rio South Suite 110 San Diego, CA 92108 Phone: 1-800-SPARKPE ext. 208 Email: prosengard@sparkpe.org Web Site: www.sparkpe.org</p> <p>Cost: \$50.00 to \$75.00 plus S&H (additional costs for teacher training)</p>
TAKE 10!®	Grades K-5 elementary program	<p>Reduce sedentary time during the school day</p> <p>Add structured, 10 minute bouts of physical activity to classroom</p> <p>Provide integrated (activity & academics) curriculum tool to elementary school teachers.</p>	<ul style="list-style-type: none"> • The student enjoyment rate exceeded 90% throughout the first 10-week implementation. • 80% of teachers reported that they would recommend the program to another teacher. • 75% of the teachers reported that they were able to do a TAKE 10! Activity at least 3 times per week in the first 2 semesters. • Energy expenditure data indicates activities fall in moderate-to-vigorous range. • Sustained use after 1 year in 60-80% of teachers (3 or more times per week). • Pre-K & Home & Middle School pilot studies in progress 2001-2003. 	<p>Shannon Williams Program Manager Physical Activity & Nutrition (PAN) ILSI Center for Health Promotion 2295 Parklake Drive Suite 450 Atlanta, GA 30345 Phone: 770-934-1010 Fax: 770-934-7126 Email: take10@ilsi.org Web: www.take10.net</p> <p>Grade Kit: \$79.00 plus S&H</p>

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
CATCH (Coordinated Approach to Child Health)	Grades K-5 4 sites: TX, MN, CA, LA Follow-up in grades 6-8	Environmental changes: Reduce total fat, saturated fat, and sodium content of food served in school to 30, 10% of calories and 600-1000 mg/serving, respectively; Increase the amount of PE class time that students spend in moderate to vigorous PA to 40% Individual change: reduce total cholesterol by 5mg/dl	<ul style="list-style-type: none"> Increased moderate-to-vigorous physical activity during PE Increased out-of-school vigorous physical activity No change in fitness <p>Follow-up on first intervention students:</p> <ul style="list-style-type: none"> Self-reported daily intake was identical in control and intervention groups Intervention group self-reported higher daily physical activity Intervention group showed significant difference for dietary knowledge and intentions No change in serum cholesterol Gap is closing between control and experimental schools in follow-up <p>CATCH Kids Club After School Program available.</p>	Distributor: FlagHouse Phone: 1-800-793-7900 Fax: 1-800-793-7922 Email: sales@flaghouse.com 601 FlagHouse Drive Hasbrouck Heights, NJ 07604-3116 Principal Investigator: Steven H. Kelder, M.P.H., Ph.D. Associate Professor of Epidemiology & Behavioral Sciences Center for Health Promotion Research & Development, Director, Outreach Education Univ of TX - HSC at Houston
Cardiovascular Health in Children (CHIC)	Grades 3-4	Improve health in children with at least 2 CVD risk factors Compare effectiveness of classroom-wide program with a program providing more individualized intervention	<ul style="list-style-type: none"> 422 children in 18 rural and urban schools Both classroom and small groups experienced similar reductions in cholesterol, blood pressure, and body fat. Both groups showed increases in health knowledge. Positive results were stronger in the more easily implemented classroom approach. 	Joanne S. Harrell, RN, PhD, FAAN University of North Carolina at Chapel Hill, School of Nursing CB# 7460, 506 Carrington Chapel Hill, NC 27599-7460 Email: chic@unc.edu
Pathways	Grades 3-5, American Indian children	Implement a culturally appropriate school-based intervention program that promotes healthy eating and to increase physical activity to prevent obesity	<ul style="list-style-type: none"> Close working collaboration with school staff and educational and tribal authorities Development of the four intervention components and instruments for measurement 	University of Minnesota School of Public Health Division of Epidemiology 1300 South Second Street Suite 300 Minneapolis, MN 55454-1015 For more information, see Website: http://hsc.unm.edu/pathways

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
OPPrA	Grades 3-5 FU– grade 6	Social cognitive theory and self-monitoring programs TV turnoff period Classroom curriculum Changes in PE and Lunches	<ul style="list-style-type: none"> • Measured BMI, body fat and girth • Intervention is ongoing through 2001 	Thomas Robinson, MD Assistant Professor Pediatrics/Medicine 1000 Welch Road, #100 Stanford, CA 94305-5757 Email: Tom.Robinson@Stanford.edu Work Phone: 650-723-5331
Eat Well & Keep Moving	Upper elementary school-aged children (Grades 4-5)	Behavior targets include: increase fruits & vegetable intake; decrease total & saturated fat; increase moderate to vigorous physical activity; decrease television viewing.	<ul style="list-style-type: none"> • 4 hours less time per week watching TV • Increased fruits and vegetables consumption • Decreased total and saturated fats intake • Enables teachers to promote good health practices in conjunction with math, science, language arts, and social studies • Implemented in 40 of Baltimore's 122 grade schools 	© 2003 Human Kinetics Publishers, Inc. P.O. Box 5076 Champaign, Illinois 61825-5076 Phone: 1-800-747-4457 Email: orders@hkusa.com Cost: \$42.00 Lead Author: Lilian Cheung, DSc, Department of Nutrition, Harvard Univ. School of Public Health
FIT KIDS	6-12 year old children, their parents and caregivers	Implement lifestyle changes to increase fitness/health Acquire understanding of / increased sensitivity to hunger, appetite, and fullness Understand relationship between fitness and body Increase self-esteem and develop a more positive body image.	<ul style="list-style-type: none"> • Three main focus areas: fitness, nutrition, and self-esteem. • Program implemented to 347 families during the past 4 years. • In a 4 year follow-up evaluation, 86% of kids stated they know how to listen to their bodies' messages regarding feeling full. • Abstract to be published in the Journal of the American Dietetic Association. 	Beth Passehl FIT KIDS Community Health Development and Advocacy Phone: 404-929-8793 Email: beth.passehl@choa.org
GEMS (Girls Health Enrichment Multi-Site Program)	8-10 year old African American Females	Reduce risk for obesity and associated health problems by developing/evaluating a community and family-based behavioral intervention program	<ul style="list-style-type: none"> • Increase overall levels of physical activity • Increase consumption of fruits & vegetables • Decrease consumption of high-fat foods • Family involvement encouraged through use of take-home activities 	For more information: Website: http://www.bsc.gwu.edu/gems/ Supplement on GEMS coming out in 2/2003 in Ethnicity and Disease

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
Planet Health	Adolescent Grades 6-7	Obesity reduction as primary outcome Decrease TV viewing, increase fruits & vegetable intake, decrease fat intake, increase physical activity	<ul style="list-style-type: none"> Significant reduction in the prevalence of obesity (defined as BMI and a triceps skinfold greater than the 85th percentile) was observed for girls / none in boys. Effects of intervention on adiposity were largely due to changes in television viewing. 	<p>© 2003 Human Kinetics Publishers, Inc. P.O. Box 5076 Champaign, IL 61825-5076 Phone: 800-747-4457 Email: orders@hkusa.com Cost: \$42.00</p> <p>Lead Author: Jill Carter, MA, MEd, Project Director, Harvard Prevention Research Center</p>
Teens Eating for Energy and Nutrition at School (TEENS)	Grade 7 students, 16 schools in Minneapolis-St. Paul area	Improve fruit, vegetable, and reduce fat intake among middle school students	<ul style="list-style-type: none"> TEENS demonstrated that students with the greatest "dose" of the program – those that were peer leaders, had the classroom curriculum, and were exposed to environmental changes – were more likely to change their fruit, vegetable, and fat intake compared with other students. This program was one of the very few that has worked with teens as the target audience, had a very innovative curriculum, and was partially taught by peer leaders. 	<p>The materials can be obtained from the Learning Zone Express Phone: 1-800-455-7003 Web: www.learningzoneexpress.com</p> <p>Reference: Birnbaum, AS, Lytle LA, Story M, Perry CL, Murray DM. Are differences in exposure to a multicomponent school-based intervention associated with varying dietary outcomes in adolescents? <i>Health Education & Behavior</i>. 2002; 29(4):427-443</p>
Generation Fit	Youth 11-18 years (school and community groups)	Strengthen community action skills (i.e. planning, advocacy, communications) Participate in projects related to physical activity, healthy eating	<ul style="list-style-type: none"> MS students got peers' favorite healthy foods added to school lunch menu. HS students organized food drive & prepared homeless shelter meals. Athletic team developed a fitness trail for the entire community at their school. High school PE students advocated for repair of community parks. 	<p>Alexis Williams, MPH, CHES American Cancer Society 1599 Clifton Rd NE Atlanta, GA 30329 Phone: 404-329-7616 Email: awilliam@cancer.org</p>

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
Go Girls!	Adolescent African American Females	Improve both diet and physical activity patterns, using a social cognitive framework	<ul style="list-style-type: none"> • Purpose was to measure feasibility and salience of intervention in public housing (rather than efficacy). • Physiologic, dietary and behavioral assessments at baseline and post intervention. 	Ken Resnicow, PhD Assoc. Professor Emory University The Rollins School of Public Health 1518 Clifton Road Atlanta, Georgia 30322 Phone: 404-727-7222 Fax: 404-727-1369 E-Mail: Kresnic@sph.emory.edu
New Moves	Females in High School	Place less emphasis on a thin-oriented society Females are encouraged to feel good about themselves by altering their behavior to incorporate healthy eating and physical fitness	<ul style="list-style-type: none"> • Offered fun, non-competitive physical activity, nutritional guidance, and social support. • Data collection continues. 	Dianne Neumark-Sztainer, PhD, RD Project Coordinator Division of Epidemiology, School of Public Health University of Minnesota Minneapolis, MN 55454 Phone: 612-624-1818 E-Mail: neumark@epi.umn.edu
PACE+ (Patient-centered Assessment for Counseling & Exercise, plus Nutrition)	Adolescents and Adults	Provide Interactive health communications programs for primary care settings via the computer	<ul style="list-style-type: none"> • Assess and intervene on multiple behaviors • Collect, compile, summarize self-report information • Create individually tailored action or relapse-prevention plans for health behavior change 	Judith Prochaska, MS San Diego State University 6363 Alvarado Court, Suite 250 San Diego, CA 92120 E-Mail: prochask@sunstroke.sdsu.edu

* The information above was derived by ILSI CHP staff from published research, journal articles, abstract reviews, and direct contact with investigators. Inquiries regarding specific program and evaluation results should be addressed to the contact person for that program.

Overview of Childhood Weight Management Intervention Programs**

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
KidShape®	Ages 3-5 and ages 6-14 Grades Pre-K through 8	Increase awareness and promote adoption of a healthy lifestyle, including healthy eating, physical activity participation, and building positive self-esteem for entire families with overweight or obese children	<ul style="list-style-type: none"> Licenses two separate curriculums: KidShape and KinderShape. Study results - 87% of program participants demonstrated weight loss and 80% kept it off for at least two years. KinderShape is a six-week program that is suitable for delivery to parents and daycare workers. Classes: nutrition for families and adults, active play for students, behavior modification for adults, cooking demonstrations, arts and crafts, and family physical activity. 	KidShape® 8733 Beverly Blvd. Suite 400 Los Angeles, CA 90048 Phone: 1-888-600-6444 Email: info@kidshape.com
SHAPEDOWN	Four program levels: Level 1 (6 to 8 years) Level 2 (9 to 10 years) Level 3 (11 to 12 years) Level 4 (13 to 18 years).	Children and teens in SHAPEDOWN: <ul style="list-style-type: none"> enhance their self-esteem, improve peer relationships, adopt healthier habits, begin to normalize their weight within their genetic potential 	<ul style="list-style-type: none"> Program shown to be effective at 10-year follow-up. Educational meetings designed to enhance self-esteem and peer relationships while adopting healthier habits considering genetic and environmental influences. Weight loss is gradual - ranging from weight maintenance to no more than one pound per week loss. Integrates cultural, economic, and ethnic differences into materials with workbooks that include examples of a broad range of family types. 	SHAPEDOWN 1323 San Anselmo Avenue San Anselmo, CA 94960 Phone: 415-453-8886 Email: www.shapedown@aol.com

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
Committed to Kids®	children ages 6 to 18 years	An individualized approach to weight management conducted in an outpatient, group setting	<ul style="list-style-type: none"> • The CTK program has been thoroughly evaluated (more than 15 published articles). • Program uses a team-based approach including a physician, registered dietitian, exercise physiologist, and behavior specialist. • A significant decrease in body weight, body fat and BMI has been found in 62.5% individuals who completed the one-year program. • A short-term success rate (10-20 weeks) of 95% and a one-year success rate of 70-75% has been cited in other published research. • A new book, TRIM KIDS™: The Proven 12-Week Plan That Has Helped Thousands of Children Achieve a Healthier Weight, has been released based on the implementation and evaluation of CTK. 	Committed to Kids 248 Aris Avenue Metairie, LA 70005 Web: http://www.committed-to-kids.com/home.html
SUNY Buffalo Childhood Weight Control Program	Grades K-5 ages 6-12 years	The program utilizes the Stoplight Diet to help decrease the intake of energy dense foods in younger children; the program includes individual counseling and group education sessions that focus on behavioral choice theory.	<ul style="list-style-type: none"> • Reduction of sedentary behavior. • Stoplight Diet - categorizes foods (similar to the Food Guide Pyramid) and then codes the foods into three-color categories: green or GO foods, yellow or CAUTION foods, and red or STOP foods. • In a four-month, family-based weight management program with children, 8-12 years old, who were monitored at 10 years post-intervention, 34% of participants had maintained a decreased weight of more than 20%. 	Colleen Kilanowski Program Coordinator SUNY Buffalo G-56 Farber Hall South Campus Phone: 716-829-3400 Email: ckk@buffalo.edu

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
HealthWorks!™	Ages 5 to 10 years; ages 11 to 19 years	The HealthWorks! intervention for overweight children and adolescents is part of the Heart Center at Cincinnati Children's Hospital Medical Center.	<ul style="list-style-type: none"> The program uses a team-based treatment approach including: a physician, a registered dietician, a psychologist, a nurse, an exercise physiologist, and an exercise instructor along with the child and their family Results for participants who completed the initial 12-week phase indicate that the majority had a reduction in BMI. 	HealthWorks! 3333 Burnet Avenue Cincinnati, OH 45229-3139 Phone: 513-636-4305 Fax: 513-636-2459 Web: www.cincinnatichildrens.org/svc/prog/healthworks/default.htm
Operation Zero	An Obesity Management Program for Adolescents	<ul style="list-style-type: none"> Healthier lifestyle Exercise program Better ways to prepare food Reduce fat intake 	<p>8 week program; meet 1x/week, 1 hour, with monthly follow-up</p> <p>Decreased BMI, body fat and increase physical activity levels</p>	Luke Beno, MD Director, Operation Zero Phone: 770-603-3604 Fax: 770-603-3674
L.E.S.T.E.R.® (Let's Eat Smart, Then Exercise Right)	Ages 6 to 11 years	8-week program focused on: balanced diet, increasing physical activity, and addressing emotional relationships within the family, includes follow-up protocol.	<ul style="list-style-type: none"> Improvements in patterns of eating, exercise habits, attitudes, blood pressure, and nutrition knowledge (demonstrated in pre- and post-testing). Significant decreases in anthropometric measures upon completion of program. Decrease in both total caloric and percent fat intake. Follow-up - 83% of respondents had positive eating and exercise behaviors. 	The Children's Hospital of Alabama 1600 7th Avenue South Department of Clinical Nutrition ACC Suite 416 Attention: Sue Teske, MS, RD, CNSD Birmingham, AL 35233 Email: Susan.Teske@chsys.org

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
A Weigh of Life	Children and Adolescents	To help children and adolescents: <ul style="list-style-type: none"> • change activity behaviors • change eating behaviors • keep weight off 	Program includes 15 "projects", e.g.: <ul style="list-style-type: none"> • Form new eating habits • Control when, where, and how you eat • Plan meals • Establish exercise routine • Increase daily activity 	Texas Children's Hospital Nutrition and Gastroenterology Department Texas Children's Hospital 6621 Fannin St. MC 3391 Houston, TX 77030-2399 Web: www.texaschildrenshospital.org
Healthy Habits (HH)	Adolescents	Evaluate post-treatment and short-term follow-up efficacy of 4-month behavioral weight control program for overweight adolescents. Evaluate participant satisfaction of program.	<ul style="list-style-type: none"> • HH adolescents evidenced better change in body mass index z scores to post-treatment than TC (typical care) adolescents. • Body mass index z scores changed similarly in conditions from post-treatment through follow-up. • Behavioral skills use was higher among HH than TC adolescents. • Behavioral skills use was related to better weight outcome. • The behavioral intervention evidenced good feasibility and participant satisfaction. 	B.E. Saelens Department of Pediatrics Division of Psychology Children's Hospital Medical Center Cincinnati, Ohio 45229 Email: brian.saelens@chmcc.org

** The information provided above is derived from published research, journal articles, abstract reviews, and direct contact with investigators. Inquiries regarding specific program results should be addressed to the contact person for that program.

Other Physical Activity and Nutrition Resources***

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
Generation Fit	Students ages 11-18 years	Students take part in community service projects that promote more physical activity and healthier eating among their friends and families, and in their schools and communities.	<ul style="list-style-type: none"> • Food for Thought: Trying new recipes in your cafeteria • Message Magic: Selling healthy eating and physical activity • Lending a Helping Hand: Planning meals for those in need • Team Up for Good Health: Improving habits with a partner • Let's Get Moving: Making physical activity a priority in our community 	For more information about the Generation Fit Action Packet, contact your local American Cancer Society or call 1-800-ACS-2345
Team Nutrition	Grades pre-K through 12	To empower schools to serve meals that meet the Dietary Guidelines for Americans , and motivate children in grades pre-K through 12 to make healthy eating choices.	Team Nutrition Supporters participate in school activities such as: presenting nutrition and health fairs; write about Team Nutrition in their newsletters; and reinforce Team Nutrition in the community by personalizing and reproducing Team Nutrition materials for employees, constituents and community organizations.	USDA Team Nutrition Child Nutrition Division 3101 Park Center Drive Room 1010 Alexandria, VA 22302 Fax: 703-305-2879
School Health Index	All Grades	Publication: <i>SHI: School Health Index For Physical Activity, Healthy Eating and a Tobacco-Free Lifestyle</i>	The SHI is a self-assessment and planning tool that enable schools to: <ul style="list-style-type: none"> • Identify the strengths and weaknesses of your school's health promotion policies and programs; • Develop an action plan for improving student health; and • Involve teachers, parents, students and the community in improving school policies and programs. 	Centers for Disease Control and Prevention, Division of Adolescent and School Health (DASH) To order, contact: HealthyYouth@cdc.gov

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
Fit, Healthy and Ready to Learn	All grades/ages	Publication: The State Education Standard Vol. 3, No. 4 Autumn 2002	A few featured articles: <ul style="list-style-type: none"> • Education Reform and the Goals of Modern School Health Programs • The Untapped Power of Schools to Improve the Health of Teens • Creating a Healthy School Nutrition Environment 	Contact: The State Education Standard National Association of State Boards of Education 277 South Washington St. Suite 100 Alexandria, VA 22314 Phone: 703-684-4000 Fax: 703-836-2313 To subscribe, go to www.boards.org
Kids Walk To School Day	Adolescents and Adults	<ul style="list-style-type: none"> • Children walk and bike to/from school. • Emphasize regular PA for children, improved pedestrian safety, and healthy and walkable community environments. • Communities working together to create safe routes to school 	Anticipated benefits: <ul style="list-style-type: none"> • Increased levels of daily physical activity for children • Increased likelihood that children and adults will choose to walk and bike for other short distance trips • Improved neighborhood safety • Fewer cars traveling through the neighborhood • Fewer cars congesting the pick-up and drop-off points at the school 	Kidswalk-to-School Centers for Disease Control and Prevention 4770 Buford Hwy, NE, Ms/K-46 Atlanta, GA 30341 Email: ccdinfo@cdc.gov
Bright Futures	Children and Adolescents and Families	Focus areas: oral health, nutrition, mental health and physical activity Promote and improve the health, education, and well being of children, adolescents, families and communities	<ul style="list-style-type: none"> • Develop materials and tools for families, health professionals, schools, and communities • Disseminate Bright Futures content, philosophy, and materials • Train health professionals, other professionals, families, and communities • Develop and maintain partnerships • Evaluate and refine these ongoing efforts 	For more information: Website: www.brightfutures.org

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
Hearts in Parks	Youth and older adults	Communities in NC, rural & urban settings Add value to existing summer programs at parks facilities	<ul style="list-style-type: none"> • Pre- and post tests used • Qualitative data collected • Program ongoing through 2000 • Nearly 90 park & rec agencies in 35+ states have expressed interest in becoming Hearts n' Parks communities 	National Recreation and Park Assoc. 22377 Belmont Ridge Rd. Ashburn, VA 20148 Phone: 703-858-2162 Fax: 703-729-4753 Toll free: 1-800-649-3042 E-mail: programs@nrpa.org
<i>FITNESSGRAM</i>	K-12 physical activity assessment program	Fitness assessment of choice for thousands of schools and is used for millions of children and youth annually.	<ul style="list-style-type: none"> • Each of the test items are selected to assess important aspects of a student' s fitness, not skill or agility. • Students are compared not to each other, but to health fitness standards, carefully established for each age and gender, that indicate good health. • Participants receive objective, personalized feedback and positive reinforcement, which are vital to changing behavior and serve as a communications link between teachers and parents. 	For details, contact http://www.cooperinst.org/ftgmain.asp Or to order, contact: American Fitness Alliance Phone: 1-800-747-4457 x 2407 / 2408 Web: www.americanfitness.net
CANFit (California Adolescent Nutrition and Fitness program)	Children and Adolescents ages 10-14 years	Improve nutritional status and physical fitness of California's low-income African American, Latino, and Pacific Islander youth	<ul style="list-style-type: none"> • Provide funding, training, and technical assistance to community programs • Evaluate and disseminate effective strategies for community program development • More than 100 grantees & scholarships 	Arnell J. Hinkle, RD, MPH, CHES California Adolescent Nutrition and Fitness Program 2140 Shattuck Ave., Suite 610 Berkeley, CA 94704

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
<p>Physical Best</p> <p>Practical Health-related Youth fitness education Standards-based Inclusive Comprehensive Age appropriate Lifestyle</p> <p>Behavioral approach Enjoyable! Self-responsibility Teaching energy balance</p>	K-12	The purpose of the program is to assist physical educators in teaching health-related fitness education, through quality resources and professional development training, with a focus on inclusiveness of all children, enjoyment of physical activity, and teaching cognitive concepts and knowledge through activity.	<ul style="list-style-type: none"> • Inclusive: all students participate • Non-competitive: students work to improve themselves • Progressive: resources follow proven educational progressions that help students take more responsibility for their own health-related fitness • Individualized: students set personal goals based on their individual fitness • Positive: makes physical activity and education a positive experience for all • Ready to use: activities outline prep., implementation and follow-up lessons • Incorporates the latest scientific information • Linked to nat'l PE, dance & health standards. • Often used in conjunction with <i>FITNESSGRAM</i>. 	For more information, contact Physical Best: Phone: 1-800-213-7193 Website: www.aahperd.org/physicalbest
Smart Stepping	Elementary through college	A program incorporating movement, walking, math, health and physical education, active living and learning.	<p>Since 1981 Creative Walking Inc., has helped over 5,000 schools and school districts implement walking and wellness programs.</p> <p>No evaluation data available on website. Testimonials available for review.</p>	<p>Robert Sweetgall Phone: 1-888-421-9255 toll free Fax: 314-721-0303 Email: rob@creativewalking.com Website: www.creativewalking.com</p> <p>Cost for the Smart Stepping Resource Package is \$22.00 plus S&H</p>

Program Name	Grade/Age	Goal(s)	Accomplishments	Contact Information
Project LEAN (Leaders Encouraging Activity and Nutrition)	All ages and populations in California Selected by the Kaiser Family Fdn's 1987 public awareness campaign to promote low-fat eating	<ul style="list-style-type: none"> • Create healthier communities through policy/environmental changes • Educate Californians re: healthy foods and physical activity • Conduct research-based, consumer-driven nutrition and physical activity campaigns 	California Project LEAN programs: <ul style="list-style-type: none"> • Food on the Run (adolescents) www.caprojectlean.org/about/default.asp • School Board Nutrition Policy Project • California Bone Health Campaign for Low Income Latino Mothers • Community-Based Social Marketing • California Nutrition Network • California Obesity Prevention Initiative 	Website: www.californiaprojectlean.org California Project LEAN P.O. Box 942732 MS-675 Sacramento, CA 94234-7320 Phone: 916-323-4742 Fax: 916-445-7571 Project LEAN funds 12 regional offices.

***The information provided above has been gathered through websites and direct contact with organizations and does not constitute a comprehensive listing of national physical activity and nutrition programs. Inquiries or questions regarding programs should be addressed to the contact person for that program.

The above lists are provided for information and reference purposes only and are not intended to be a "recommendation" of any specific program or intervention by the ILSI Center for Health Promotion. Other programs can be submitted for consideration to chp@ilsi.org.



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