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The Epidemic of Childhood Obesity: Review of Research and Implications for Public Policy

Jenelle S. Krishnamoorthy, Chantelle Hart, and Elissa Jelalian

Abstract

Over the past 30 years, the rate of childhood obesity has more than doubled for preschool children aged 2 to 5 years and adolescents aged 12 to 19 years, and it has more than tripled for children 6 to 11 years of age (Institute of Medicine, 2005). At present, approximately 9 million children over 6 years are considered obese (Institute of Medicine, 2005). Thus, pediatric obesity is clearly an epidemic in need of preventive and intervention efforts (Wang & Dietz, 2002). Given the scope of this epidemic, effective public policy is needed to address the pediatric obesity problem (Dietz, Bland, Gortmaker, Molloy, & Schmid, 2002). The scale of this problem requires a multifaceted approach across several sectors of society, including the academic community, government, and the private sector to promote health in our children. This report reviews current research findings regarding the increased prevalence of pediatric obesity and the efficacy of prevention and intervention efforts and makes policy recommendations based on these research conclusions. The goal of this paper is to bridge the divide between public policy and the scientific literature to assist government officials in making informed decisions based on empirical findings.

The first section of this report describes the serious and substantial medical and psychosocial risks associated with pediatric obesity; the report also details the sociocultural variables that are thought to contribute to the significant increase in prevalence in this country. Prevention and intervention efforts that have been developed to improve behaviors—such as diet and physical activity—and programs that are designed to decrease body mass index (BMI) in children who are already overweight are reviewed. Findings from these studies suggest that prevention efforts that focus on only one venue, such as school, may not be adequate to significantly impact the obesity of US children. Sociocultural variables are associated with the increased prevalence of pediatric obesity, which require that government, the private and public sector, communities, and families must work together to curb this epidemic. Of utmost importance is the government's collaboration with the academic community in making sure that any programmatic efforts have a rigorous evaluation.

Social Policy Report

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From the Editor

In this issue of the *Social Policy Report*, Krishnamoorthy, Hart, and Jelalian review the research on childhood obesity and discuss the implications for policy.

There is little question that there is an obesity epidemic in this country, and it is affecting children and teens dramatically. As this article notes, in preschoolers and teens, obesity has doubled across the past 30 years and it has tripled in school-aged children. Childhood obesity relates to obesity in adulthood, and obesity relates to a host of serious health problems such as diabetes and heart disease. This epidemic constitutes a public health emergency as serious as any we have seen in recent decades.

There are several contributing factors, each addressed comprehensively in this article. They include: the easy and quick availability of tasty yet highly caloric foods at relatively low cost and in large quantities, the pervasive marketing of such foods especially to children, and the tendency toward a sedentary life style. Favorite leisure activities such as TV and videogames contribute to children's inactivity. Children need to eat healthier foods, eat less, and be more active.

However, obesity is not an ailment that can be treated with medicines such as vaccines or pills. Instead it requires behavior change. Those foods most problematic in terms of causing obesity are also the ones that appeal to humans' biologically based taste preferences. Increasing activity levels requires reducing TV viewing and videogame play, which hold high appeal for children. Hence, tackling the epidemic requires behavior change that is relatively difficult to achieve. This article reviews the successes and failures of existing prevention and intervention efforts. Intervention to treat obese children is necessary to encourage weight loss, and prevention efforts are necessary in this society of overeating to make sure that non-obese children stay that way.

One of the biggest assets of this article is its Bronfenbrennian Ecological Systems approach to policy recommendations. These authors stress that change is required at multiple levels, and they offer suggestions for how parents, schools, communities, and governments can each do their part to tackle this epidemic.

While there has been increased public attention to this epidemic in recent years, it is not clear that any direct actions are being taken to address it. Brooke and I hope that this *SPR*, along with other research attention such as a Future of Children volume on children and weight, will serve to galvanize action at the varied levels addressed in this article. Policies are needed to encourage action at each level; given the difficulty of change necessary to address this epidemic, action is unlikely to occur without some prod. We also hope that this *SPR* may stir SRCD members to do serious research on effective ways to tackle the epidemic at each of these varied levels.

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The Epidemic of Childhood Obesity: Review of Research and Implications for Public Policy

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There has been a dramatic increase in pediatric obesity in the United States within the last two decades. According to the National Health and Nutritional Examination Survey (NHANES III) 1999-2002 data, approximately 31% of 6- to 19-year-olds in the US are overweight or at risk of becoming overweight, as defined by a body mass index (BMI; kg/m^2) at or above the 85th percentile (Hedley et al., 2004). This marks a twofold increase in pediatric obesity in the last 20 years (Ogden, Flegal, Carroll, & Johnson, 2002). The rise in overweight is associated with a threefold increase in the economic burden of pediatric obesity. An estimate of national hospital costs associated with pediatric obesity and its associated diseases (i.e., apnea, Type II diabetes, and gallbladder disease) was placed at $127 million dollars/year (in 2001 constant dollars), excluding costs associated with physician visits, medication, and indirect costs associated with obesity (Wang & Dietz, 2002). Thus, pediatric obesity is clearly an epidemic in need of preventive and intervention efforts (Wang & Dietz, 2002).

Effective public policy is needed to address the pediatric obesity problem (Dietz, Bland, Gortmaker, Molloy, & Schmid, 2002; Wang & Brownell, 2005). Although a number of variables, including genetic factors, are associated with overweight, children's eating and exercise habits have been implicated in the sharp rise in pediatric obesity over the past two decades (Hill & Peters, 1998), suggesting that policy targeted at increasing children's activity level and promoting healthy eating is greatly needed. Given the scope of the problem, a multifaceted approach across sectors of society, including the academic community, government, and the private sector, must be coordinated to promote health in our children. The present review has been conducted to outline the current status of research findings regarding comorbidities, prevention, and intervention efforts related to pediatric obesity, and to make policy recommendations based on these research conclusions. The goal of this paper is to bridge the divide between public policy and the scientific literature to assist government officials in making informed decisions based on empirical findings.

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Medical and Psychosocial Risks Associated With Pediatric Obesity

Overweight children and adolescents are at increased risk for a number of medical comorbidities, including hypertension, non-insulin dependent diabetes mellitus, insulin resistance, impaired glucose tolerance, obstructive sleep apnea, and asthma (Freedman, Dietz, Srinivasan, & Berenson, 1999; Must & Strauss, 1999; Yanovski, 2001). They are also more likely to be diagnosed with orthopedic and metabolic diseases such as dyslipidemia and hypercholesterolemia (Must & Strauss, 1999; Yanovski, 2001). Furthermore, pediatric obesity is associated with obesity in adulthood (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997), which in turn is related to increased rates of morbidity and mortality (Bray, 2004) and is typically difficult to treat (Hill & Trowbridge, 1998).

In addition to medical comorbidity, overweight children and adolescents are at increased risk for social and emotional difficulties. Childhood obesity is associated with lowered self-esteem, diminished body image, decreased quality of life, and increased symptoms of depression (e.g., Israel & Ivanova, 2002; Neumark-Sztainer et al., 2002). Children who are overweight have increased peer difficulties, including being teased (Neumark-Sztainer et al., 2002) and marginalized (Strauss & Pollack, 2003) by peers more often than normal weight children. Furthermore, there is some evidence that pediatric obesity may be associated with the development

of disordered eating such as binge eating (Berkowitz, Stunkard, & Stallings, 1993; Morgan et al., 2002). Thus, obesity places children at risk for a number of comorbid conditions.

Predisposing Factors for Pediatric Obesity: Genetic and Environmental Considerations

It is well understood that both genetic and environmental factors play a role in the development of obesity. While there is a well-recognized genetic contribution to the variability in weight (Schousboe et al., 2004), genetic contributions are unlikely to solely account for the dramatic rise in obesity within the past 20 years, suggesting that changes in children's eating and exercise habits play a critical role (Hill & Peters, 1998). A number of environmental factors are associated with increased rates of pediatric obesity. These include changes in: family eating and activity patterns, the school environment (e.g., quality of school lunches, decreased time spent in physical education classes), community development, and the influence of the media in promoting high calorie foods and sedentary behaviors. Each of these societal changes will be briefly reviewed below.

A multifaceted approach across sectors of society, including the academic community, government, and the private sector, must be coordinated to promote health in our children.

Overweight children and adolescents are at increased risk for a number of medical comorbidities, including hypertension, non-insulin dependent diabetes mellitus, insulin resistance, impaired glucose tolerance, obstructive sleep apnea, and asthma.

Changes within US culture associated with childhood obesity. US culture has also played an important role in the increase of pediatric obesity in recent years. Today US children consume more energy-dense foods and are less physically active than they were 20 to 30 years ago (American Dietetic Association, 2004). Not surprisingly, children who do not regularly exercise and watch a lot of television daily are more likely to be overweight (Grund, Krause, Siewers, Rieckers, & Muller, 2001; Trost, Kerr, Ward, & Pate, 2001).

Many experts have linked the significant increase in childhood obesity to the increase of advertising of unhealthy foods and drinks to children (Horgen, Choate, & Brownell, 2001; Troiano & Flegal, 1998. Kunkel and Gantz (1992) found that the average child is exposed to more than 40,000 television commercials per year. An estimated 80% of advertising targeted at children falls within four areas: fast food restaurants, cereals, candies, and toys (Kunkel & Gantz, 1992). With the advancement of technology, children view increasing numbers of advertisements on television, movies, radio, internet, video games, and at school. There is evidence that these advertisements are effective in persuading children to request these products from adults (Borzekowski & Robinson, 2001; Taras, Sallis, Patterson, Nader, & Nelson, 1989). For example, one study found that watching advertisements for fruit juices or sugary drinks/candy influenced food choices, with children being more likely to consume the product that was advertised (Gorn & Goldberg, 1982).

Studies have also found that community design has a direct impact on human behavior (Frank, Engelke, & Schmid, 2003). The focus of community development since the late 1940s has led to increasing opportunities for automobile use, which many times results in a decrease of sidewalks (USDHHS, 2000). Walkways and bicycle paths are often difficult to find in new communities that have been developed since the 1960s (USDHHS, 2000). Studies have reported that nearly 25% of trips made from home are less than 1 mile away from origin, but 75% of these trips are made in a vehicle (US Dept. of Transportation, 1997). Rutherford et al. (1998) found that people are more physically active when they live in communities that have sidewalks, streets that lead to other streets and stores, and have greater housing and population density. "Walkable communities" appear to have a positive impact on the amount of physical activity that residents engage in on a daily basis (Sallis & Owen, 1999). However, the trend in community development has been away from such community designs.

Components of the school environment associated with childhood obesity. In addition to cultural changes,

a number of changes have occurred more specifically within the school environment. This coupled with the increased time that children spend in the school setting at after-school programs and daycare (Datar & Sturm, 2004) has negatively contributed to children's eating and activity habits. Many of the "competitive foods" now sold in school cafeterias, vending machines, school stores, and school fundraisers are typically high in calories and low in nutritional value (US General Accounting Office, 2003). The availability of competitive foods is associated with reduced consumption of more nutritious foods, such as fruits and vegetables, as well as with increased consumption of sweetened beverages (Kubik et. al., 2003).

In addition to influencing children's eating habits, the school environment plays a role in the amount of physical activity in which children engage. Young people obtain most of their physical activity in two settings: school physical education classes and local community programs (Strong, et al., 2005). However, due to budgetary constraints, schools are being forced to cut back on physical education classes at school (Nestle & Jacobson, 2000). As a result, the Surgeon General has reported that participation in physical education (PE) classes at school has dropped from 42% in 1991 to 25% in 1995 (Surgeon General, 1996). Furthermore, research has shown that many of the current PE classes need to be revamped to meet recommendations for physical activity in youth. For example, studies released by the National Institute for Health Care Management Research and Educational Foundation (2004) report that only 16% of kindergarten programs meet the recommendations of the Centers for Disease Control and Prevention for daily physical education, with schools with low-income and ethnic minority students being less likely to meet these standards. Moreover, observations of classes in primary and middle schools reveal that only 3 minutes in the average 30-minute class are spent doing moderate to vigorous physical activity (Simmons-Morton, Taylor, Snider, Huang, & Fulton, 1994). Thus, the combination of increased exposure to high-calorie foods in school settings coupled with decreased opportunities for physical activity have placed children at greater risk for weight problems.

Effective pediatric weight management interventions typically involve a number of common elements, including involvement of parents, dietary prescription and education, and an exercise plan.

Changes in the home environment associated with increased rates of pediatric obesity. Throughout childhood, caregivers assume primary responsibility for food availability at home. Children learn about food and eating within the family environment, and family food selection, level of food monitoring, and eating patterns may contribute to weight gain (Birch & Fisher, 1998; Fisher & Birch, 1999; Gillman et al., 2000). Over the past 20 to 30 years, family eating patterns have changed to an increased reliance on meals prepared outside of the home (French, Story, & Jeffery, 2001) and fewer families sitting down for dinner together (Gillman et al., 2000). For example, the number of families who eat outside of the home has increased by 89% between 1972 and 1995 (French, Story, & Jeffery, 2001). Eating outside of the home is associated with increased consumption of calories, with an estimated 200 more calories per day consumed when the same foods are eaten outside of the home (French, Story, & Jeffery, 2001). Furthermore, sitting down for a family dinner at home is associated with increased intake of nutrient-dense foods (Gillman et al., 2000).

Prevention and Intervention Approaches for Pediatric Overweight and Obesity

Having reviewed the multiple variables thought to contribute to the obesity epidemic, we turn to consider prevention and intervention approaches that have been developed to address this concern. Highlighting critical components of prevention and intervention programs will help to inform effective policy change. One strategy for addressing the pediatric obesity epidemic is development of prevention programs targeting weight and weight-related behaviors. The majority of such programs have been offered in the school setting.

School-Based Programs to Promote Healthier Eating, Activity, and Weight

Although schools potentially have a unique opportunity to make influential contributions to both the prevention and treatment of childhood obesity, relatively few prevention research studies that are targeted specifi-

cally at preventing obesity have been conducted. Most of these studies have resulted in modest short-term results. For example, the CATCH (Child and Adolescent Trial for Cardiovascular Health) intervention focused on reducing dietary fat consumption and increasing physical activity and resulted in changes in both of those behaviors but not a significant BMI change after 2 school years (Luepker, Perry, McKinlay, et al., 1996). Translation of this program for primarily Hispanic youth showed some evidence of slowing the percentage of children at risk for being overweight, but similar to the original trial did not show any changes in BMI (Coleman et al., 2005). Planet Health is a multidisplinary curriculum that attempted to increase fruit and vegetable consumption, reduce fat intake, increase physical activity, and limit television-viewing time. After 2 school years of the program, the prevalence of obesity significantly decreased among girls but not boys (Gortmaker, Peterson, & Wiecha, 1999). The most influential factor determined to contribute to weight loss was reduced television viewing time. Another program called APPLES (Active Programme Promoting Lifestyle Education in Schools) involved nutrition education, access to healthy café lunches, a physical activity component, improved playground infrastructure, and after-school activities. After 1 year, students increased their vegetable intake but did not change other behaviors. Furthermore, there was not a significant decrease in children's BMI (Sahota, Rudolf, Dixey, Hill, Barth, & Cade, 2001). Other investigations with preschoolers in Head Start (i.e., Hip-Hop to Health Jr.; Fitzgibbon et al., 2005) and studies in secondary schools (e.g., French, Story, Fulkerson, & Hannan, 2004; Neumark-Sztainer, Story, Hannan, & Rex, 2003) have found similar results. While school-based interventions have led to short-term changes in targeted behaviors, they have not consistently resulted in reductions in BMI.

> Given the increased prevalence of obesity in children and adolescents, intensive interventions such as very low calorie diets or protein sparing modified fasts, behavioral treatment offered in a residential or camp setting, pharmacotherapy, and bariatric surgery have been used with morbidly obese adolescents.

Community-Based Interventions

In addition to the above school-based approaches, investigators have also targeted community-level prevention approaches to address the obesity epidemic. One campaign, VERB, which was launched by the Center for Disease Control and Prevention, used a combination of paid advertisements within schools and the community as well as internet activities to promote physical activities as a "cool" and enjoyable way to interact with peers (Huhman, Potter, Wong, Banspach, Duke, & Heitzler, 2005). While not all children responded to the campaign, subgroups of children sampled, including younger children (9 to 10 years old) and children who were more aware of the campaign, did increase their physical activity levels. A focused community-based study that targeted switching to low-fat milk resulted in some success, with overall milk sales increasing in intervention cities and the market share of low-fat milk increasing following the campaign (Reger, Wootan, Booth-Butterfield, & Smith, 1998). While this may suggest that targeted campaigns in the community can be successful, other evidence in the area of physical activity promotion speaks to the contrary. For example, one investigation, Active Winners, targeted solely at increasing physical activity, showed no significant effect (Pate et al., 2003).

A more recent, ongoing study is evaluating a more comprehensive community-based approach to obesity prevention. Shape Up Somerville utilizes community partnerships to create healthy eating and physical activity messages and increase opportunities for healthy eating and physical activity in 1st to 3rd grade students (Economos & Collins, 2004). The intervention includes changes to the school's food program, implementation of in-school and after-school curriculum, parent and community outreach, involvement of local restaurants, developing walkable routes to school, and collaboration with school nurses and pediatricians. Preliminary results of this intervention suggest an increase in the daily physical activity among high-risk children (Economos & Collins, 2004).

Interventions to Decrease Pediatric Obesity

In addition to preventive approaches, a number of studies have evaluated the effectiveness of interventions to promote weight loss in children who are overweight. Several comprehensive reviews of pediatric weight control interventions have recently been conducted

(e.g., Jelalian & Salens, 1999; Epstein, 2003) with some evidence that pediatric weight loss interventions lead to long-term weight loss for some children. For example, after 10 years, 30% of children treated in four different family-based intervention studies achieved non-obese status (Epstein, Valoski, Wing, & McCurley, 1994). While continued research is needed to identify determinants of success in pediatric weight loss trials, important intervention components have been identified.

Effective pediatric weight management interventions typically involve a number of common elements, including involvement of parents, dietary prescription and education, and an exercise plan. Research has shown that targeting parents for weight loss leads to better short- and long-term weight loss in children (Epstein, Wing, Koeske, Andrasik, & Ossip, 1981; Epstein, McCurley, Wing, & Valoski, 1990; Epstein, Valoski, Wing, & McCurley, 1994; Golan, Weizman, Apter, & Fainaru, 1998; Golan & Crow, 2004). The importance of parental involvement, however, is less clear in adolescent trials with studies finding mixed results in terms of adolescent weight loss (Brownell, Kelman, & Stunkard, 1983; Coates, Killen, & Slinkard, 1982; Wadden et al., 1990).

One area that may be amenable to support from government is the school environment. Currently, the Secretary of Agriculture only has authority over foods that are served in the school cafeteria.

In addition to parental involvement, research has supported the use of dietary prescriptions (i.e., calorie restrictions and limiting dietary fat) and physical activity in promoting weight loss in children. The dietary intervention with the most empirical support is the Traffic Light Diet for school age children (8 to 12 years of age) in which foods are assigned to the colors of a traffic light based on nutritional value and fat content of food choices, with green indicating "go" (e.g., vegetables such as broccoli), yellow indicating "caution" (e.g., tuna and low-fat yogurt), and red denoting "stop" (e.g., french fries and donuts) (Epstein, Wing, Koeske, & Valoski, 1984; Epstein, Wing, Steranchak, Dickson, & Michelson, 1980). In terms of physical activity, both lifestyle changes (i.e., taking the stairs instead of the elevator) and prescribed aerobic activity have shown benefits in promoting weight loss (Epstein et al., 1982; Epstein, Valoski, Wing, & McCurley, 1994). Furthermore, decreasing children's sedentary behavior (e.g., television viewing, playing video games) has also shown promise in promoting weight loss (Epstein et al., 1995; Epstein, Paluch, Gordy, & Dorn, 2000; Epstein et al., 2004).

Intensive Weight Control Interventions

Given the increased prevalence of obesity in children and adolescents, intensive interventions such as very low calorie diets (VLCDs) or protein sparing modified fasts, behavioral treatment offered in a residential or camp setting, pharmacotherapy, and bariatric surgery have been used with morbidly obese adolescents. Treatments provided in residential and inpatient settings show some promise as effective strategies for weight loss (Barton, Walker, Lambert, Gately, & Hill, 2004; Dao et al., 2000). Furthermore, pharmacotherapy such as the use of sibutramine and orlistat show some promise when used alone or in combination with behavioral interventions (Berkowitz, Wadden, Tershakovec, & Cronquist, 2003; Godoy-Matos et al., 2005). However, more research is needed to ensure that pharmacotherapy is a safe and effective alternative for morbidly obese adolescents. Finally, bariatric surgery may be a viable treatment option with severely overweight adolescents. However, it has been recommended that bariatric surgery be used with caution with more conservative selection criteria used for adolescents than with adults (BMI $\geq$ 35 with comorbidities or BMI $\geq$ 40 with or without comorbidities) because some obese adolescents do not become obese adults, that less invasive behavioral treatments may be more effective in adolescents than adults, and because the medical comorbidities associated with adolescent obesity are not of a severity to warrant surgery in minors (Inge et al., 2004). Furthermore, it is recommended that surgery not be performed in children (i.e., < 13 years) who do not have the decisional capacity for serious interventions (Inge et al., 2004).

Recommendations

A number of factors have been identified as playing a role in the child obesity epidemic. Historically, prevention and intervention approaches have been focused in nature and have therefore found limited results in terms of weight outcomes. More recently, experts have argued that to quell the obesity

epidemic, a multifaceted approach that incorporates interventions at all levels of society (i.e., the larger culture, communities, schools, and homes) must be designed and evaluated (Institute of Medicine, 2005; Wang & Brownell, 2005). Clearly, efforts in one sector will not be successful without the support from the other sectors involved in a child's daily life. The following recommendations for each sector are based on research findings and recommendations from experts in the field of pediatric obesity.

Government Recommendations

There are many important roles that federal, state, and local governments can play to address this national issue. It will take coordination and cooperation among the three areas of government to support programs in various sectors of society. One area that may be amenable to support from government is the school environment. Currently, the Secretary of Agriculture only has authority over foods that are served in the school cafeteria. The National Alliance for Nutrition Activity, which includes the American Heart Association, American Dietetic Association, American Public Health Association, and several county healthy departments, state nutrition councils, and school districts, recommends that the federal government consider expanding the authority of the Secretary to cover all foods served within schools (American College of Preventive Medicine, 2003). This would potentially help ensure that foods served in vending machines and after-school programs include healthy options. This combined with continued efforts to regulate the quality of foods provided in school settings can help ensure that children are exposed to a healthier diet. The Institute of Medicine also suggests that the federal government determine recommended nutritional guidelines for the sale of all foods and beverages sold in schools (Institute of Medicine, 2005).

There are a number of countries that have already taken steps to reduce the amount of junk food marketing toward children.

The media is another sector of society on which government can have an impact. For example, there are a number of countries that have already taken steps to reduce the amount of junk food marketing toward children. Australia does not allow marketing during programs for preschool children (Australian Broadcast Authority, 2002). Austria bans advertising during children's programming, while Sweden and Norway have banned television advertising directed at children during children's programs and directly before and after the program ends (International Research Associates, 2001). In school environments in Austria, Belguim, Germany, and Portugal, marketing is prohibited (Consumentenbond, 1996). The US has made some of these changes with regard to the marketing of tobacco products to children. It is against the law to advertise cigarettes and other forms of tobacco on television and radio in the US (FTC, 2003b). The Department of Justice enforces this law (American Cancer Society et al., 2002). In 1978 the Federal Trade Commission (FTC) published a report that recommended banning television advertising directed at children, restricting commercials for sugary foods aimed at older children, and suggested that advertisers of sugary foods also fund healthy advertisements to balance their other advertisements (CSPI, 2003). However, this recommendation was never enacted and currently it is more difficult for the FTC to regulate advertising for children than for adults (Jacobson & Maxwell, 1994). The federal government could examine the implications of giving the FTC the authority to establish guidelines for the amount of advertising of foods with low nutrient density toward children (CSPI, 2003). Additionally, the federal government should consider sponsoring healthy media campaigns to promote healthy nutrition and physical activity and support research examining the impact of food marketing on a child's diet to inform policy development (Institute of Medicine, 2005). Currently, the entire budget for the "5 A Day" campaign is $3.5 million a year, compared to $665 million for McDonald's, $209 million for Coke, and $74 million for Pringles (Brownell & Hogan, 2004). This discrepancy points to the need for both government sponsorship of healthy media campaigns and a public-private partnership to address obesity-related behaviors in the media.

Another potential area for government involvement is within the health care system. The current US system is designed to treat rather than prevent illness. Several chronic diseases are associated with obesity, includ-

ing diabetes, hypertension, and cardiovascular disease (Freedman et al., 1999). A number of studies have shown that preventing chronic disease results in increased productivity, decreased health care expenditure, and lower rates of absenteeism (USDHHS, 2003). The government should examine federal health care programs and increase opportunities for coverage of preventive services by all health professionals.

Other areas for local, state, and federal government involvement include support of community designs and programs. Several studies and groups have recommended that federal, state, and local governments work together to support community proposals to develop an active environment (Institute of Medicine, 2005). Given research suggesting that community design can help foster increased physical activity (Saelens, Sallis, & Frank, 2003), the federal government could fund new road projects that accommodate bicycles and pedestrians. Local and state governments should assist schools in developing school wellness policies and integrating resources from the community into the school setting (Institute of Medicine, 2005).

The government should examine federal health care programs and increase opportunities for coverage of preventive services by all health professionals.

Parents who struggle with economic challenges need to balance real world constraints of buying food that is lower in cost.

Groups that are at increased risk for obesity may need the extra support of communities and government to assist in the goal of leading a healthy lifestyle. Parents who struggle with economic challenges need to balance real world constraints of buying food that is lower in cost. A number of studies have found that less expensive food tends to be of lower nutritional value (Wilson, Nicholson, & Krishnamoorthy, 1996). In addition, grocery stores in low-income communities many times do not provide fresh fruits and vegetables and low-fat and low-calorie options for their customers (Wilson, Nicholson, & Krishnamoorthy, 1996). Finally, many of these neighborhoods are not safe and consequently do not allow children access to recommended lifestyle physical activity (Eyler et al., 1998). This situation makes it increasingly difficult for families to provide access to a healthy environment with regard to nutrition and physical activity. Federal, state, and local governments should consider examining programs that could address these challenges for groups at increased risk—for example, subsidizing the cost of fresh fruits and vegetables (Institute of Medicine, 2005). In fact, it has been recommended that a small tax be added on to the sale of soft drinks and snack foods to promote healthier eating (Jacobsen & Brownell, 2000). Jacobsen and Brownell (2000) cited Arkansas's 2-cent tax on soft drinks as generating $40 million dollars per year. This revenue, in turn, could be earmarked for health promotion campaigns and subsidizing the cost of fruits and vegetables.

Community Recommendations

There are several areas in which communities can act as a resource in combating the obesity epidemic (USDHHS, 2000). Many communities have recreation centers. Several of these centers offer after-school programs that many young people attend while their parents are at work. These facilities can be utilized to offer children and adolescents an opportunity to engage in physical activity. Recreation centers can also teach cooking classes, nutrition, health, and fitness.

Communities can also take it upon themselves to advocate for walkable neighborhoods. Research has shown that the design of a community can influence the physical activity of its citizens (Saleans, Sallis, & Frank, 2003). It is common for urban and suburban neighborhoods to lack sidewalks, resulting in children and families needing to bike and walk on the street. Community leaders may be in a position to leverage local governments to develop neighborhoods that are pedestrian friendly, including shops, grocery stores, and other amenities that are within walking distance of the community to encourage walking rather than driving for daily necessities (Frank, Andresen, & Schmidt, 2004).

Health Care Recommendations

Health care professionals are at a unique advantage

to screen children at well visits to identify children at risk of overweight and provide education regarding the development of a healthy lifestyle for children and parents. The American Academy of Pediatrics (AAP, 2003) recommends that health care professionals: identify and track patients at risk for obesity due to genetic or environmental factors; calculate and plot BMI once a year in all children and adolescents; use change in BMI to identify rate of excessive weight gain relative to linear growth; encourage, support, and protect breastfeeding; encourage parents and caregivers to promote healthy eating patterns by offering nutritious snacks, such as vegetables and fruits, low-fat dairy foods, and whole grains; encourage children's autonomy in self-regulation of food intake and setting appropriate limits on choices; and model healthy food choices. In addition, health professionals should routinely promote physical activity, including unstructured play at home, in school, in child care settings, and within the community, and recommend limiting sedentary behavior or "screen time" to a maximum of 2 hours per day (AAP, 2003). While pediatricians should counsel all children regarding healthy eating and activity, a referral to a health educator, nutritionist, or weight control program should be considered after initial screening identifies a child as overweight or at risk of overweight (AAP, 2003).

It is important that the industry provide clear and consistent media messages and balance the advertising of healthy products along with those that are low in nutrient value.

Schools should consider establishing a local school wellness policy that includes goals for nutrition education, physical activity, and other school-based activities designed to promote student wellness.

Additional changes need to occur in health insurance coverage. Currently, many health insurance plans reimburse for services after a child is diagnosed with an illness. For example, an insurance plan may only reimburse for nutritional services once a child has developed diabetes or another chronic illness related to obesity (AOA, 2005). There is many times no allowance for preventive services. A second concern is that many plans do not cover nutritional and behavioral change counseling by health professionals other than pediatricians (AOA, 2005). Nutritionists, psychologists, and exercise physiologists typically conduct these services for overweight patients and often experience difficulty obtaining reimbursement. Some insurance companies will grant a few sessions for this type of presentation; however, it is unrealistic to expect a psychologist or nutritionist to help support significant behavioral changes to prevent obesity with an at-risk child in two or three visits.

Employers may be in a position to help with healthcare coverage for obesity prevention by advocating for and offering good medical benefits to their employees that include preventive services. The costs to US businesses of obesity-related health problems in 1994 added up to almost $13 billion, with approximately $8 billion of this going towards health insurance expenditures, $2.4 billion for sick leave, $1.8 billion for life insurance, and close to $1 billion for disability insurance (USDHHS, 2003). On an individual level, it costs an average of $2,700 to insure an American without diabetes for a year (USDHHS, 2003). It costs $13,243 to insure an American who does have diabetes (USDHHS, 2003). These statistics support the fact that employer spending on prevention is a good investment, potentially resulting in lower health care expenses, lower absenteeism, and increased productivity.

Private and Public Sector Recommendations

There are many initiatives that could be embraced at the level of the private and public sectors to improve the lifestyle of Americans. Private industry has an opportunity to develop products that are healthier and attractive to children (Brownell & Horgen, 2004). Incentives for children, such as prizes, could be provided for the consumption of healthy foods rather than products that are high in sugar or fat. Other opportunities for

change include connecting learning incentives to healthy rather than unhealthy products (i.e., counting books using fruits and vegetables rather than high-calorie snack foods) (CSPI, 2003). Furthermore, the development of partnerships such as the one between Sesame Street Workshop and Sunkist to promote fruit consumption and additional healthy eating habits (CSPI, 2005) are greatly needed.

Just as the government has a responsibility to ensure that children are exposed to healthy eating campaigns, industry also shares this responsibility. It is estimated that children see more than 40,000 television commercials over the course of their childhood (Kunkel & Gantz, 1992). Unfortunately, many of these advertisements are during Saturday morning programming and are for high-sugar and high-fat products (CSPI, 2003). It is important that the industry provide clear and consistent media messages and balance the advertising of healthy products along with those that are low in nutrient value (Brownell & Horgen, 2004).

Parents and primary caregivers generally control the food that is available at home, are responsible for food preparation, and provide access to physical activity, particularly for young children. Parents also have a unique ability to act as role models for their children.

School Recommendations

Schools are increasingly where children are spending more hours of the day (Datar & Sturm, 2004). Schools provide an opportunity for serving healthy food choices, providing access to physical activity, and teaching children about healthy nutrition and physical activity. Schools should consider establishing a local school wellness policy that includes goals for nutrition education, physical activity, and other school-based activities designed to promote student wellness (Weight Realities Division of the Society for Nutrition Education, 2003). The process of developing school wellness policies could include representation from the local education agency, parents, students, the school board, physical education teachers, and health care professionals. One agenda for such policy would be the development of nutritional guidelines that are applicable to all foods available during the school day. The overall objective of wellness policy would be to promote healthy nutrition, improve student health, and reduce childhood obesity (Institute of Medicine, 2005).

The school environment is critical for supporting healthy nutrition, with many children eating two or more meals at school (Radzikowski & Gale, 1984; Farris et al, 1992). Schools could play a role in examining the food quality offered in the cafeteria and increase access to fresh fruits and vegetables, low-fat dairy, and whole-grain products. Schools should also examine the foods and beverages that are sold in vending machines, school stores, or as part of school fundraisers. Many of these foods are typically high in sugar, fat, and calories and low in nutritional value (Bell & Swinburn, 2004). One study found that replacing standard a la carte items with healthier choices did not lead to a loss in revenue (Lyltle et al., 2004). Another study found that lowering prices of healthier a la carte items led to a fourfold increase in fruit sales and twice as many carrot sales (French, et al, 1997). This preliminary evidence suggests that schools can provide healthier options without losing revenue.

It has been estimated that children obtain between 20 and 40% of their total physical activity at school and, for most, physical education class may be the only opportunity for moderate or vigorous activity within the day (Simons-Morton et al, 1994). There is research to suggest that a school wellness policy may help to address the lack of physical activity opportunities offered in the school environment (Thorpe, et al, 2004). A study conducted in 2000 found that only 8% of elementary schools, 6.4% of middle schools, and 5.8% of high schools provided daily physical education for the entire school year for all of the students in each grade (Institute of Medicine, 2005). Based on recommendations from the Centers for Disease Control and Prevention as well as other sources, schools should require that all children participate in a minimum of 30 minutes of moderate to vigorous physical activity during the school day (Strong et al, 2005).

Many companies have approached schools to promote and advertise their products in the school environment (CSPI, 2003). Often a school's sports scoreboard bears the name of a company, school buses have advertising, or school functions are sponsored by allowing promotion

of a company's products. Frequently, products that are marketed in this setting are ones that are low in nutrient density. Furthermore, many schools have several soft drink, candy, and fast food restaurant contracts (CSPI, 2003). Schools should assume responsibility for decreasing the promotion and marketing of products low in nutrient value in the service of providing a healthier environment (Horgen, Choate, & Brownell, 2001).

Parent Recommendations

Parents and primary caregivers can play a significant role in developing healthy habits and lifestyle for their children (Birch & Fisher, 1998). They generally control the food that is available at home, are responsible for food preparation, and provide access to physical activity, particularly for young children. Parents also have a unique ability to act as role models for their children (Laessle, Uhl, & Lindel, 2001). Parents' own lifestyle habits can influence how a child relates to food choices and physical activity. However, many parents lack information regarding appropriate nutrition intake for children. Thus, an intervention targeted at children has the likelihood of being more successful if it involves the entire family adopting healthier lifestyles and includes some basic education on making behavioral changes (Weight Realities Division of the Society for Nutrition Education, 2003).

Although families can play a pivotal role in fostering healthy eating and activity patterns, it is incumbent upon health care professionals and policymakers to provide parents with a consistent and coherent message related to healthy nutrition for their children. Currently there are a number of messages that parents receive about the benefits and drawbacks of different eating patterns, which can often be confusing for parents who are attempting to balance busy lifestyles and the associated costs of adopting a healthier lifestyle with the many messages they are receiving through the media.

Television viewing is another activity that has increased during the last two decades. Studies have found that children who watch 5 hours of television per day are 4.6 times as likely to be obese as those watching no television or up to 2 hours daily (Institute of Medicine, 2005). The American Academy of Pediatrics therefore recommends that both television viewing and video games be limited to no more than 2 hours per day (AAP, 2001). Parents can play a role in monitoring their children's television viewing and other video game activities. There is research to support that limiting the amount of children's sedentary behavior can have a positive impact on physical activity and weight (Epstein et al., 1994).

Prevention of pediatric obesity must be a national priority that engages several sectors of society.

Conclusions

Changes in the American lifestyle have put the health of our children at increased risk. The prevalence of pediatric obesity and its significant comorbidities have dramatically increased and reached epidemic proportions. Prevention of pediatric obesity must be a national priority that engages several sectors of society. The academic community, government, local communities, and individual families all play a role and must be coordinated in a multifaceted approach to promote children's health. With these efforts comes a responsibility to ensure that preventive and intervention efforts, as well as policy changes, are effective. It is therefore imperative that the implementation of any positive changes be accompanied by well-designed evaluations to determine their utility. This collaborative effort offers an opportunity for multiple sectors of society to support each other to improve the well being of our children.

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Purpose

Social Policy Report (ISSN 1075-7031) is published four times a year by the Society for Research in Child Development. Its purpose is twofold: (1) to provide policymakers with objective reviews of research findings on topics of current national interest, and (2) to inform the SRCD membership about current policy issues relating to children and about the state of relevant research.

Content

The *Report* provides a forum for scholarly reviews and discussions of developmental research and its implications for policies affecting children. The Society recognizes that few policy issues are noncontroversial, that authors may well have a "point of view," but the *Report* is not intended to be a vehicle for authors to advocate particular positions on issues. Presentations should be balanced, accurate, and inclusive. The publication nonetheless includes the disclaimer that the views expressed do not necessarily reflect those of the Society or the editors.

Procedures for Submission and Manuscript Preparation

Articles originate from a variety of sources. Some are solicited, but authors interested in submitting a manuscript are urged to propose timely topics to the editors. Manuscripts vary in length ranging from 20 to 30 pages of double-spaced text (approximately 8,000 to 14,000 words) plus references. Authors are asked to submit manuscripts electronically, if possible, but hard copy may be submitted with disk. Manuscripts should adhere to APA style and include text, references, and a brief biographical statement limited to the author's current position and special activities related to the topic. (See page 2, this issue, for the editors' email addresses.)

Three or four reviews are obtained from academic or policy specialists with relevant expertise and different perspectives. Authors then make revisions based on these reviews and the editors' queries, working closely with the editors to arrive at the final form for publication.

The Committee on Child Development, Public Policy, and Public Information, which founded the *Report*, serves as an advisory body to all activities related to its publication.