

Schools and Obesity Prevention: Creating School Environments and Policies to Promote Healthy Eating and Physical Activity

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Context: Research consistently shows that the majority of American children do not consume diets that meet the recommendations of the Dietary Guidelines for Americans, nor do they achieve adequate levels of daily physical activity. As a result, more children are overweight today than at any other time in U.S. history. Schools offer many opportunities to develop strategies to prevent obesity by creating environments in which children eat healthfully and engage regularly in physical activity.

Methods: This article discusses the role of schools in obesity prevention efforts. Current issues in schools' food and physical activity environments are examined, as well as federal, state, and local policies related to food and physical activity standards in schools. The article is organized around four key areas: (1) school food environments and policies, (2) school physical activity environments and policies, (3) school body mass index measurements, and (4) school wellness policies. Recommendations for accelerating change also are addressed.

Findings: The article found that (1) competitive foods (foods sold outside of federally reimbursed school meals) are widely available in schools, especially secondary schools. Studies have related the availability of snacks and drinks sold in schools to students' high intake of total calories, soft drinks, total fat and saturated fat, and lower intake of fruits and vegetables; (2) physical activity can be added to the school curriculum without academic consequences and also can offer physical, emotional, and social benefits. Policy leadership has come

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The Milbank Quarterly, Vol. 87, No. 1, 2009 (pp. 71–100)
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predominantly from the districts, then the states, and, to a much lesser extent, the federal government; (3) few studies have examined the effectiveness or impact of school-based BMI measurement programs; and (4) early comparative analyses of local school wellness policies suggest that the strongest policies are found in larger school districts and districts with a greater number of students eligible for a free or reduced-price lunch.

Conclusions: Studies show that schools have been making some progress in improving the school food and physical activity environments but that much more work is needed. Stronger policies are needed to provide healthier meals to students at schools; limit their access to low-nutrient, energy-dense foods during the school day; and increase the frequency, intensity, and duration of physical activity at school.

Keywords: Schools, obesity prevention, nutrition and physical activity policies, children and adolescents.

PROGRESS IN ADDRESSING CHILDHOOD OBESITY WILL REQUIRE the coordinated and collective efforts of many different stakeholders working in multiple sectors and settings. Schools are identified as a key setting for public health strategies to lower or prevent the prevalence of overweight and obesity (IOM 2005; U.S. Department of Health and Human Services 2001). While the schools alone cannot solve the childhood obesity epidemic, it also is unlikely that childhood obesity rates can be reversed without strong school-based policies and programs to support healthy eating and physical activity. Children spend more time in schools than in any other environment away from home. More than 48 million students attend 94,000 public elementary, middle, and secondary schools each day, and an additional 5.3 million students attend 30,000 private schools (Frumkin 2006). More than 95 percent of American youth aged five to seventeen are enrolled in school, and no other institution has as much continuous and intensive contact and influence on children during their first two decades of life. The school system's primary role is to educate students in both academic subjects and the civic values and social responsibilities that will prepare them to reach their full potential (Frumkin 2006). Health and education success are intertwined: schools cannot achieve their primary mission of education if students are not healthy and fit. Schools have an unparalleled

opportunity to promote children's health by creating an environment in which children eat healthy foods, engage in regular physical activity, and learn lifelong skills for healthy eating and active living.

In this article, we discuss the role of schools in obesity prevention efforts, current issues in schools' food and physical activity environments, as well as federal, state, and local policies related to food and physical activity standards in schools. The article is organized around four key areas: (1) school food environments and policies, (2) school physical activity environment and policies, (3) school body mass index measurements, and (4) school wellness policies. Finally, we offer recommendations for future research.

School Food Environment and Policies

The school food environment has the potential to have a large impact on children's and adolescents' diets because they consume a substantial proportion (between 19 and 50 percent) of their total daily calories at school (Gleason and Suiitor 2001). Food and beverages at school fall into two main categories: (1) federal school lunch and breakfast programs and (2) foods and beverages sold outside the formal meal programs, specifically à la carte items available in the school cafeteria and venues outside the cafeteria, such as vending machines, snack bars, school stores, and fund-raisers. This latter category is called *competitive foods* because they compete with the nutritionally regulated school meal program.

School Foods Sold Outside Meals (Competitive Foods)

Availability of Competitive Foods. The rise in obesity over the past few decades has been accompanied by an increase in the number of food options available throughout the school day (IOM 2007). The national 2006 School Health Policies and Programs Study (SHPPS) (O'Toole et al. 2007) conducted by the Centers for Disease Prevention and Control (CDC) found that 33 percent of elementary schools, 71 percent of middle schools, and 89 percent of high schools had a vending machine or a school store, canteen, or snack bar where students could purchase food or beverages. The most common beverages sold were sports drinks, sodas, and fruit drinks (not 100 percent juice), and the most common

foods sold were higher-fat salty snacks. High schools and middle schools were more likely to sell competitive foods than were elementary schools. Since the previous SHPPS in 2000, U.S. schools have made strides in improving the school food environment. For example, from 2000 to 2006, the percentage of school districts prohibiting vending machines offering high-calorie, low-nutrition foods and beverages rose from 4 to 30 percent; schools selling water in vending machines or school stores increased from 30 to 46 percent; and schools selling cookies, cake, or other high-fat baked goods in vending machines or school stores fell from 38 to 25 percent (O'Toole et al. 2007). SHPPS 2006 data indicate that while some progress has been made, much more is needed. SHPPS 2006 provides a disconcerting picture of the continued widespread availability of low-nutrition, high-fat, and high-sugar foods in U.S. schools, especially high schools. For example, more than three-fourths of high schools sold sodas or high-sugar fruit drinks, and almost half of high schools allow students to buy food and beverages from vending machines or school stores (O'Toole et al. 2007).

The third School Nutrition and Dietary Assessment study (SNDA-III) (Finkelstein, Hill, and Whitaker 2008; Gordon and Fox 2007) also confirmed that schools' current offerings do not fully support a healthy diet for children and adolescents. The study found vending machines in 17 percent, 82 percent, and 97 percent of elementary, middle, and high schools, respectively, and à la carte items were sold in 85 percent of schools. These sources often contain low-nutrient, energy-dense foods. Unhealthy foods were much more pervasive in high schools than in elementary schools and in rural schools more often than in urban and suburban schools, but there were no significant differences between low-income and higher-income schools (Finkelstein, Hill, and Whitaker 2008). Fund-raisers that focused on food or beverage sales also were common, being held in 37 percent of elementary schools and 50 to 60 percent of middle and high schools (Gordon and Fox 2007).

Impact of Competitive Foods on Child Nutrition. SNDA-III found that students consumed more than 150 calories from competitive, low-nutrition, energy-dense foods. Competitive foods were consumed by fewer National School Lunch Program (NSLP) participants than non-participants (Gordon and Fox 2007). Several studies have related the availability of snacks and drinks sold in schools to higher intakes of total calories, soft drinks, total fat and saturated fat, and lower intakes of fruits

and vegetables, milk, and key nutrients (Cullen et al. 2000; Cullen and Thompson 2005; Cullen and Zakeri 2004; Kubik et al. 2003). Kubik and colleagues (2003) examined the association between seventh- and eighth-grade students' dietary behaviors and schools' vending machines and à la carte programs. School à la carte availability was inversely associated with daily fruit and vegetable consumption and positively associated with daily total fat and saturated fat intake. Snack vending machines were negatively associated with fruit consumption. In a longitudinal study, Cullen and Zakeri (2004) found that middle school students who gained access to school snack bars consumed fewer fruits and nonstarchy vegetables, less milk, and more sweetened beverages and high-fat vegetables compared with the previous school year, when they were in elementary schools and had access only to lunch served at school. In schools with food policies restricting access to less nutritious competitive foods, middle and high school students consumed less of these foods during the school day (Cullen et al. 2006; Hartstein et al. 2008; Neumark-Sztainer et al. 2005). Kubik, Lytle, and Story (2005) examined the association between body mass index (BMI) in young adolescents and schools' food practices, such as foods used in school fund-raising and in the classroom as rewards. Students' BMI increased by 0.10 BMI units for every additional food practice permitted in their school. This study suggests that regular exposure to common school food practices may increase students' risk for weight gain.

Impact of Competitive Foods on School Revenue. Many school districts are hesitant to enact policies that restrict competitive food offerings, fearing that such actions will result in substantially decreased revenue. A recent systematic review of the literature examined seven studies, and the evidence to date suggests that the majority of schools have been able to improve the nutritional value of competitive foods without their changing overall revenue (Wharton, Long, and Schwartz 2008). Thus, even though the available data are limited, they do not support the concern that improving the nutritional quality of competitive foods will hurt school revenue.

Furthermore, a few of the studies assessed NSLP participation before and after the changes in competitive food offerings and found that the number of students choosing the school lunch increased over time. An important area for further study is the hypothesis that when competitive foods are limited, participation in the school meal program increases, effectively compensating for revenue losses in snack sales.

Federal Policies. Federally subsidized school meals are required by Congress and the U.S. Department of Agriculture (USDA) to meet nutrition standards and comply with the Dietary Guidelines for Americans. However, foods and beverages sold outside the federally reimbursable school meal programs are largely exempt from such requirements. The USDA currently does not have the authority to regulate foods or beverages sold outside the cafeteria or outside mealtimes. Federal requirements for competitive foods, established in 1979, are based on “foods of minimal nutritional value” and apply only to foods sold in the cafeteria during mealtimes. These standards are weak, outdated, and arbitrary; for example, candy bars, chips, and fruitades (with little juice) are allowed for sale in the cafeteria, but jelly beans and seltzer water are not. Currently, federal regulations do not cover competitive foods sold outside the cafeteria. Several organizations have called for federal efforts to update nutrition standards for school foods sold outside school meals to ensure that they conform with the Dietary Guidelines for Americans (National Alliance for Nutrition and Activity 2008).

In 2007, the Institute of Medicine (IOM) (2007) released a report with recommendations for national standards for competitive foods. It concluded that federally reimbursable school nutrition programs should be the main source of nutrition at schools and that opportunities to obtain competitive foods should be limited. But if competitive foods are available, they should consist only of fruits, vegetables, whole grains, and nonfat milk and dairy products, the food groups least represented in the diets of youth. To date, the only state that has adopted most of the IOM recommendations is West Virginia, which has perhaps the country’s strongest state regulations for competitive foods.

In 2004, Congress passed the Child Nutrition and WIC Reauthorization Act of 2004, which requires that all school districts develop a wellness policy, including goals for nutrition education and nutrition guidelines for all foods available at schools. In a later section, we discuss this important federal initiative to improve the school food environment.

State Policies. State agencies can impose restrictions on the sale of all foods and beverages sold at schools participating in federal school meal programs. Since 2004, state legislative activity in the area of school nutrition has been brisk, due to concerns about childhood obesity. About half of all states (27) have adopted competitive food policies that are more restrictive than the USDA regulations, although the restrictions differ greatly in type and extent (IOM 2007). Eleven states have taken

legislative action to require higher nutritional standards for school meals than the “minimum” USDA requirements; sixteen states have set nutrition standards for foods sold outside the school meal programs; and twenty-five states limit when and where foods that are not part of the school meal programs can be sold during school hours. State policies for competitive foods tend to be most restrictive for elementary schools and least restrictive for high schools. This is worrisome, since middle and high schools have the poorest school food environments in regard to the availability of unhealthy competitive foods (IOM 2007; O’Toole et al. 2007).

In 2007, the Center for Science in the Public Interest released a report that evaluated all fifty states’ school nutrition policies regarding foods and beverages sold outside school meals (Center for Science in the Public Interest 2007). The report found that while many states had strengthened their school nutrition policies, the changes, albeit positive, were fragmented and incremental. It concluded that the nation has a patchwork of policies addressing the nutritional quality of school foods and beverages and that two-thirds of states have weak or no policies. With so many different state standards, specifying differing amounts of fats, sugars, calories, and portion sizes, food companies will have difficulty packaging and formulating products. The report emphasized that a uniform national policy is needed to establish nutrition standards for foods and beverages in schools.

National School Breakfast and Lunch Programs

The NSLP was started in 1946 in response to congressional concerns about the great number of young men who could not qualify for the World War II draft because of poor nutritional health: one-third were rejected for military service because of nutritional deficiencies (Martin 2008). Accordingly, the National School Lunch Act in 1946 was “created as a measure of national security, to safeguard the health and well-being of the nation’s children.” Now, more than sixty years later, in the midst of a childhood obesity epidemic with one-third of U.S. children being overweight or obese, we are again faced with a major health crisis that could threaten “national security” in new ways. With more than 30 million youth participating in the school lunch program every school day, the NSLP offers a potent policy tool to improve the diets of American

children. Furthermore, obesity and poor diet disproportionately affect low-income and minority children, and almost two-thirds (59 percent) of school lunches served are free or at a reduced price for students from low-income families (USDA Economic Research Service 2008). An average of 10 million children participate in the School Breakfast Program (SBP) each school day, and 81 percent of these breakfasts are provided free or at a reduced price to low-income students (USDA Food and Nutrition Service Office of Research, and Nutrition and Analysis 2008). Thus, school meals can have a large impact on children's diets, especially those of low-income youth, who are most likely to be the recipient of school meals. In addition, both obesity and hunger may coexist in low-income families, which presents a challenge for school nutrition programs in balancing the need to prevent hunger as well as obesity.

Meals served in the NSLP and SBP must meet federally defined nutrition standards in order for schools to be eligible for federal subsidies (cash reimbursements and commodity foods). Schools participating in the NSLP and SBP are required by the USDA to meet certain nutrition criteria and, since 1995, also must adhere to the Dietary Guidelines for Americans. In the past fifteen years, although schools have substantially improved the nutrition profile of school meals, most notably reducing the percentage of calories from fat and saturated fat (Fox et al. 2001), stronger efforts are needed. For example, the recent SNDA-III study (Gordon and Fox 2007) showed that although the majority of U.S. schools offer breakfasts and lunches that meet the standards for key nutrients, such as protein, vitamins A and C, calcium, and iron, fewer than one-third of public schools meet the USDA standards for total fat and saturated fat. Reducing fat in school meals to meet the Dietary Guidelines for Americans recommendations can help cut excess calories. The USDA federal regulations also have nutrition standards for appropriate calorie levels for school meals averaged over a school week (USDA Food and Nutrition Service 1988). Elementary (K through 6) lunches must have a minimum of 664 calories, and secondary (7 through 12) lunches, 825 calories. SNDA-III found that 79 percent of elementary schools met the regulatory calorie standards for lunches but that only about one-half of high schools offered lunches that were adequate in calories (Gordon et al. 2007). The current USDA standards for calories have not been revised since the early 1990s and are based on the old 1989 Recommended Energy Allowance for active children and not on the updated Dietary

Reference Intakes or the 2005 Dietary Guidelines for Americans. The Institute of Medicine has recently undertaken a study sponsored by the USDA to review and provide recommendations to revise the meal patterns and nutrition standards of the National School Lunch Program and School Breakfast Program. The report will be completed in 2010.

Financial Issues. Financial pressures are major barriers to providing more nutritious meals (U.S. General Accounting Office 2003). School food service programs, which once were regular line items in local school budgets, now must often be completely self-supporting. To try to break even financially, many food service directors are compelled to sell popular, lower-nutrition foods in the cafeteria, foods that are frequently found in other school venues (e.g., vending machines) and compete with school meals (IOM 2007). The current federal reimbursement rate for a “free” lunch is \$2.47, which the School Nutrition Association believes is not adequate to cover the cost of producing a school meal. The costs of food, transportation, labor and benefits, and indirect expenses have increased rapidly, and reimbursement has not kept pace (SNA 2008). The Omnibus Budget Reconciliation Acts of 1980 and 1981 cut federal reimbursement levels for school meals, and when adjusted for inflation, the original funding cut has never been restored (Martin 2008). The Food Service Equipment Program that provided funding to help low-resource schools purchase institutional food service was eliminated, and funding for the Nutrition Education and Training program was severely cut as well. Interestingly, when the federal budget was cut in the early 1980s, the availability of competitive foods increased. A recent USDA cost study report found that on average, school food service revenues barely cover the reported costs of producing reimbursable meals and fall short of covering the full costs incurred by the school districts, such as the salaries of food service staff (USDA Food and Nutrition Service Office of Research, and Nutrition and Analysis 2008). The SNDA-III study found that 42 percent of schools did not offer on a daily basis any fresh fruits or raw vegetables in the reimbursable school lunch. Only 5 percent of breads and rolls were made from whole grains (Gordon et al. 2007). The reason is that fresh fruits, vegetables, and whole grains cost more (Weber 2008). We need, therefore, to consider increasing reimbursement rates for school meals to help schools serve meals that meet the current Dietary Guidelines for Americans. Eliminating à la carte and vending machine foods and restricting open campuses could increase

school meal participation and thereby raise school nutrition revenues to purchase and serve healthier foods.

Supportive policies could also be enacted at the local level. School nutrition services are required to operate on a nonprofit basis, but there is considerable variation at the local level to obtain profits from food service operations through “indirect costs.” Indirect costs are not related to meal production but include rent, utilities, building maintenance, janitorial services, administration, and other costs shared with the school district. Indirect costs vary widely by states and districts. School boards exert a large degree of control over the food service program and can allow the school district’s general fund to encompass food service revenues (Wagner, Senauer, and Runge 2007). A recent economic analysis study found that indirect costs, paid by food service to the school district, hurt the quality of school meals by cutting funds to upgrade kitchens and train staff to prepare more nutritious meals (Wagner, Senauer, and Runge 2007). Not all school districts charge indirect costs to the school meal program, though, thereby allowing the school nutrition program to put all revenue back into the program’s operation. Local school district policies regarding indirect charges to the school meal programs should be explored (Miller 2009).

Other Policy-Relevant School Efforts to Improve Children’s Diets

Nutrition Education Curriculum Standards. Nutrition education is an important component of a coordinated school health approach (Kann, Telljohann, and Wooley 2007). Eating patterns are more likely to improve when changes in the school environment are integrated with classroom nutrition education (Lytle et al. 2004). Only two states, Colorado and Oklahoma, do not require schools to provide health education (Robert Wood Johnson Foundation 2008).

The national CDC 2006 SHPPS found that 70 percent of states required the topic of nutrition and dietary behavior to be taught at the elementary, middle, and high school levels as part of the health education curriculum (Kann, Telljohann, and Wooley 2007). The majority of school districts (83 percent) required nutrition to be taught. Although nutrition education appears to be common in schools, the amount offered is limited. The median number of hours per year that schools

devote to teaching nutrition education and dietary behavior is 3.4 hours for elementary schools and 5 hours for middle and high schools. In the 2006 SHPPS of fourteen broad health topics listed, teachers ranked nutrition and dietary behavior as the topic for which they most wanted staff development and training (Kann, Telljohann, and Wooley 2007). This shows the interest in nutrition and the need for more teacher training.

Farm-to-School Programs and School Gardens. Farm-to-school programs link local farmers providing fresh locally grown produce to school food service cafeterias. These programs provide high-quality local produce, promote and support locally based agriculture, and often directly connect farmers and children, as many of these programs include visits to farms and visits from farmers to the classroom, enabling students to learn how and where food is produced. Even though farm-to-school programs cannot produce the amount of fruits and vegetables needed for school meals throughout the country, they can contribute to meeting these needs. Farmers benefit from increased sales to institutions and a sense of community involvement. Farm-to-school programs have existed for nearly ten years and now number more than 1,100 (Joshi, Misako Azuma, and Feenstra 2008). A recent review of fifteen studies of farm-to-school programs pointed out that only four of the studies appeared in peer-reviewed publications (Joshi, Misako Azuma, and Feenstra 2008). Although the findings are preliminary, they suggest some promise in the greater number of school salad bars, higher school meal participation, changes in students' attitudes and behaviors in trying new foods, and increased fruit and vegetable intake (Martin 2008). The main concern with farm-to-school programs is cost, as these programs generally cost school districts more money in labor costs to prepare raw foods and arrange visits with local growers.

There also is increasing interest in school-garden programs. As outdoor "learning laboratories," these programs offer multiple opportunities for students to gain knowledge and skills regarding food systems and to realize the connections between food and the environment, to promote healthy eating, specifically fruits and vegetables, and to serve as a setting for positive youth development. School-garden programs provide an opportunity for youth to plant, harvest, and prepare vegetables and some fruits (e.g., berries, melons) and are frequently linked to the school's academic curriculum (e.g., biology, nutrition, writing). While school gardens may be a good way of improving students' fruit and vegetable

intake and preferences, few studies have evaluated their impact (Ozer 2007). As with farm-to-school programs, there is a need for rigorous, well-designed research and evaluation studies. School-garden programs can be labor intensive and expensive, and sustainability is an issue. Policy considerations for both farm-to-school and school-garden programs involve issues of impact, sustainability, and cost. Additional research and evaluation in both these areas could help guide policymakers and decision makers.

Federal Fruit and Vegetable Program. The 2002 Farm Bill created an innovative pilot program to provide free fresh fruit and vegetable snacks to students in twenty-five schools in six states. Separate and distinct from the schools' existing meals programs, the intent of the snack program was to increase children's consumption of fruits and vegetables. Implemented by the USDA, the program gives grants to schools to purchase fruits and vegetables. In 2004, Congress made the program permanent and expanded it to eight states and three Native American territories. The 2008 Farm Bill again expanded the program but limited it to elementary schools, especially lower-income schools. The program will be phased in over the next four years with new cohorts of schools each year and will reach a policy goal of \$150 million per year in 2011. There has been relatively little evaluation of the program's impact, even though the 2008 Farm Bill allocates \$3 million for this purpose.

School Physical Activity Environment and Policies

Physical Activity and Academic Performance

Longitudinal data have shown that for each weekday that normal weight adolescents participated in physical education, the odds of becoming an overweight adult decreased by 5 percent (Menschik et al. 2008). Physical education, physical activity, and sports in schools all are associated with students' better physical fitness. The connection between participation in these educational and activity programs and students' academic performance is, however, less straightforward. A review of studies concludes that up to an hour of daily physical activity programs can be added to a school curriculum by taking time from other subjects without

hurting students' academic achievement in those subjects (Trudeau and Shephard 2008). Conversely, taking time from physical education and adding it to the academic curriculum does not enhance either the students' grades in these subjects or their physical fitness (Marsh 1992).

The suggested reason for this effect is that physical activity improves students' learning efficiency. Other ways in which activity opportunities in schools, like extracurricular activities, are indirectly associated with academic achievement are lower dropout rates, better classroom behavior and self-esteem, and more engagement in and connectedness to school and on-task behavior (Mahar et al. 2006; Trudeau and Shephard 2008).

Promoting Physical Activity Standards in Schools

Several organizations have tried to aid schools by offering high-quality physical education and activity programming by recommending standards, providing funding, and supporting research. The National Association for Sport and Physical Education (NASPE) leads these efforts and has published standards defining quality physical education for elementary, middle, and high schools (National Association for Sport and Physical Education and American Heart Association 2006). The standards support a comprehensive school physical activity program and emphasize daily and minimum time requirements, curriculum and assessment standards, and certified educators with appropriate class sizes and equipment. Between 2000 and 2006, the percentage of school districts that had adopted a policy stating that schools will follow national, state, or district physical activity standards rose from 66.5 to 81.4 percent (Lee et al. 2007). The CDC currently funds education and health agencies in twenty-three states to support coordinated school health programs emphasizing the prevention of health-risk behaviors such as physical inactivity (Lee et al. 2007). In 2006, the CDC released the Physical Education Curriculum Analysis Tool (PECAT), which helps school districts evaluate curricula based on the NASPE's standards for physical education. In 2007, twenty states considered legislation to encourage safe physical activity and active transportation (Robert Wood Johnson Foundation 2008).

Federal School Physical Education and Activity Standards

There is no federal law requiring physical education to be provided to students in the American education system or any incentives for offering physical education programs (NASPE and AHA 2006). Federally sponsored policies regarding physical education and activity in schools include encouraging students' participation in and equal access to programs for both boys and girls, providing funding for equipment and staff training, and requiring local districts to set programming goals and conduct evaluations. Inconsistent with the NASPE's recommendations, there is no federal-level sponsorship of policies promoting standards for instructors' qualifications, fitness testing, or performance.

The Carol M. White Physical Education Program, also known as PEP, was established in 2001 under No Child Left Behind (NCLB) and is administered by the Education Department. Its purpose is to "award grants and contracts to initiate, expand, and improve physical education programs for all K–12 students." Funds are available for equipment purchases, student participation, and teacher and staff training and education. In 2007, 58 new awards, averaging \$312,587, and 291 continuing awards were given to local education agencies. Some critics cite the NCLB as the reason that physical education has been eliminated from schools, because the list of core academic subjects graded for achievement omits physical and health education. Another missed opportunity for physical education is alleged to be the NCLB's insistence on "highly qualified" teachers, from which physical education also is exempted because it is not listed as a core subject (NASPE and AHA 2006). Legislation has been introduced to amend the NCLB to require states to draw up plans for physical education and activity content and performance and to tie achievement standards for students to the NCLB's goals.

Under Title IX of the Education Amendments of 1972, federal law requires public schools to provide equal athletic opportunities to all students, regardless of gender:

No person shall, on the basis of sex, be excluded from participation in, be denied the benefits of, be treated differently from another person or otherwise discriminated against in any interscholastic, intercollegiate, club or intramural athletics offered by a recipient, and no recipient shall provide any such athletics separately on such basis.

Despite these federal efforts, boys continue to have the best school-based education and activity participation rates (U.S. Department of Health and Human Services 2006).

In 2004, federal legislation was passed requiring districts with federally funded school meal programs to develop and implement wellness policies, including goals for physical activity, by the beginning of the 2006/2007 school year. It is hoped that the implementation of these wellness plans will increase the number of school-based opportunities for physical activity. The federal school wellness policy is discussed later.

State-Level School Physical Education and Activity Standards

States may set general or minimum requirements or directions, but many delegate responsibility for educational decisions to the local school districts (NASPE and AHA 2006).

In 2007, twenty-five states sponsored policies promoting activity in schools across physical education/activity curricula, opportunities, instructors' expertise, and fitness testing and performance.

Curriculum. Although the majority of states do have physical education mandates for schools, they vary by level of school. Thirty-six states mandate physical education in elementary school, thirty-three states for middle or junior high school, and forty-two states for high school. But the translation of these mandates into schools' daily physical activities is significantly lower. Only 4 percent of elementary schools, 8 percent of middle and junior high schools, and 2 percent of high schools provide daily physical education (Lee et al. 2007).

Despite the national goals and recommended standards for school time spent on physical education and activity, few states have enacted legislation increasing this time or the opportunities offered in school. Currently, only eleven states require a set number of minutes spent in physical education classes for elementary schools, and even fewer do so for secondary schools. Only seven states set requirements for the amount of time that students must participate in physical education classes for middle or junior high schools, and ten states for high schools.

A few states do meet the national recommendations for weekly time spent in physical education class for elementary schools (Louisiana, New

Jersey), middle schools (Montana), and high schools (Indiana, Montana, South Carolina, District of Columbia) (NASPE and AHA 2006).

The states also are beginning to address the quality of time spent in physical education classes. Legislation enacted in 2007 by Arizona, Florida, Oregon, and Texas stated that a specified amount of physical education class time must be dedicated to moderate and vigorous activities (Robert Wood Johnson Foundation 2008). Arizona (AZ HB 2140) calls for 50 percent of physical education time to be devoted to moderate to vigorous exercise and can include recess. Texas Senate Bill 530 requires students in the sixth through eighth grades to participate in moderate to vigorous daily activity for a minimum of thirty minutes during at least four semesters. Connecticut Senate Bill 2004 promotes creative ways to reach these goals by requiring schools and municipal parks to coordinate their services. Other ways that state goals have been implemented in classrooms include the North Carolina Energizers. Energizers are ten-minute bouts of activity that integrate physical activity with academic concepts (Mahar et al. 2006).

Thirty-five of all states mandate the number of high school physical education credits that are required for a student to graduate. Of those, New Jersey requires the most, 3.75 credits. Twenty-two states require that physical education grades be included in a student's grade point average.

Recess and Walking or Biking to School. Despite the evidence-based position of the National Association for Sport and Physical Education that recess should be an integral part of elementary education—separate and distinct from physical education—only 12 percent of states require (six states require and thirteen states recommend) elementary schools to give students regularly scheduled recesses (National Association for Sport and Physical Education 2001). This percentage has risen by only 7 percent since 2000 (Centers for Disease Control and Prevention 2007a). This state-level policy means that 57 percent of districts required recess in 2006. In addition, only five states have adopted policies that prohibit denying recess as a punishment for poor behavior in the classroom. Twenty-five states have even adopted a more lenient language *discouraging* districts from doing so (Centers for Disease Control and Prevention 2007b). Similarly, districts are providing the policy leadership for encouraging walking and biking to school; 14 percent of all states (seven) and 18 percent of districts have adopted policies supporting or promoting walking or biking to and from school.

Instructors' Qualifications. Nationwide, the majority of states have adopted policies stating that newly hired staff who teach physical education must have undergraduate or graduate training in physical education. There are more state policy requirements for high school instructors (48 states) than for those in middle (43 states) or elementary schools (28 states) (Lee et al. 2007). All states offer at least one type of certification, licensure, or endorsement to teach physical education, and about half offer a combination of these. Thirty states support the certification of physical education teachers by the National Board Certification, and fourteen states pay certified teachers more (NASPE and AHA 2006).

Fitness Testing and Performance Standards. Fewer than half the states require or recommend that schools perform any of three forms of physical education assessment: written knowledge, skills performance, or fitness levels. Student fitness testing is required by states most often for high schools (8 states) and less often for middle (7 states) and elementary schools (6 states). States generally recommend (18 to 21 states) rather than require (1 to 2 states) that written knowledge and skills performance tests be performed (Lee et al. 2007).

In 2007, eleven states enacted policies to assess students' physical fitness. Most of these assessments involve body mass index measurements, described elsewhere. Delaware calls for fitness testing of students at least once in elementary, middle, and high school.

School Body Mass Index Measurements

Measuring school-based body mass index (BMI) (i.e., taking students' heights and weights and calculating BMI) and reporting the results to parents has been recommended as a way to prevent obesity (IOM 2005). The two types of school BMI measurement strategies are surveillance alone or a combination of surveillance and screening (Nihiser et al. 2007).

BMI surveillance data often are collected anonymously and are much less controversial than BMI screening programs. BMI surveillance programs gather population-level prevalence data on weight status and thereby can identify the number of students with weight problems. Surveillance data can be used to monitor and track trends in growth patterns and obesity over time to aid in the planning and delivery of services and to determine whether programs and policies are having a

desirable effect. BMI screening programs, similar to other school health screenings (e.g., hearing, vision), identify those students most at risk and give parents confidential information about their child's weight status. BMI screening and reporting programs can help increase public and professional understanding of children's weight issues and can be a useful vehicle for engaging with children and families about healthy lifestyles and weight problems (Nihiser et al. 2007). Although reporting hearing and vision results to parents has been a standard practice, sharing height and weight data has not been a routine practice and has been criticized. The concerns pertain to potential safety issues and unintended negative consequences, such as parents putting children on restrictive diets and stigmatizing them, even though no empirical data support these concerns.

In 2003, Arkansas was the first state to pass legislation mandating statewide public school-based BMI assessments, and since then, eleven states—California, Delaware, Florida, Illinois, Kansas, Maine, Missouri, New York, Pennsylvania, Tennessee, and West Virginia—have passed legislation enabling schools to measure students' BMI levels as part of either health examinations or physical education activities (Trust for America's Health 2007). The 2006 SHPPS study found that of these eleven states requiring schools or school districts to measure students' height and weight, eight mandate notifying parents of the results (Nihiser et al. 2007).

Few studies have examined the effectiveness or impact of school-based BMI measurement programs. Arkansas has the United States' most extensive school BMI initiative, which until recently required all public school students to have their BMI measured and reported annually to parents. School participation rates have been high, ranging from 94 to 99 percent of public school participation, and student assent forms range from 90 to 95 percent. Only 5 to 6 percent of students could not be measured because they or their parents refused (Justus et al. 2007). In 2008, in response to constituents' concerns about annual assessments, such as time away from class and the personnel needed, the Arkansas legislature amended the periodicity of the BMI assessments so that only students in even-numbered grades from kindergarten through tenth grade will be assessed annually. Parents must give the school a written refusal if they do not want their child to participate. The statewide BMI student monitoring data have shown that in Arkansas, schoolchildren's obesity rates have not increased since 2003 (Justus et al. 2007).

Kubik, Story, and Rieland (2007) conducted focus groups with parents to find out their opinions about BMI screening programs and message content. The parents were generally supportive of school-based BMI screening but wanted assurance that the students' privacy and respect would be maintained during the measurement and that the BMI results would be provided to parents in a neutral manner that avoided weight labeling. Kubik and colleagues (2006) also surveyed 790 parents of elementary school students after they received an individualized BMI report letter. Almost all the parents (95 percent) stated that they had read all or most of the letter. Most parents (80 percent) and children (83 percent) reported comfort with the information in the letter; parents of overweight children were more likely to report discomfort with the content. If a BMI surveillance or screening program is implemented, important concerns that must be considered are financial support for the schools and costs involved, training of staff, use of the data, privacy laws and issues, and safeguards to minimize risks to students by supplying a private, safe, and supportive environment.

School Wellness Policies

Section 204 of the 2004 Child Nutrition and WIC Reauthorization Act requires all local education agencies (LEA) participating in federally funded school meal programs (e.g., the National School Lunch and Breakfast Programs) to create a school wellness policy (SWP) by the start of the 2006/2007 school year. This law is the first successful federal effort to address the school food and activity environment (Smith 2006).

According to the federal law, school wellness policies must have five features to promote student wellness: (1) goals for nutrition education, physical activity, and other school-based activities; (2) nutrition guidelines for all foods available on each school campus during the school day; (3) assurance that guidelines for reimbursable school meals will not be less restrictive than federal regulations and guidance; (4) a plan for measuring implementation of the local wellness policy, including the designation of one or more responsible persons; and (5) the involvement of parents, students, and representatives of the school food authority, the school board, school administrators, and the public in developing the school wellness policy.

An important feature of these guidelines is that the details were left up to the local school districts; no specific national requirements were set for any of the policy components. The strategy of placing the responsibility on school districts to establish their own policies has both benefits and risks. On the positive side, giving the committee full power to write the policy and requiring the inclusion of parents, students, the public, school administrators, the board of education, and the food service sets the stage for each district to hear the views of several relevant parties and ideally to achieve a high level of buy-in and cooperation. This inclusive strategy was designed to increase compliance with the policy's implementation. On the negative side, there are no minimum national standards for policy components, such as the nutritional value of competitive foods or the amount of time devoted to physical activity, which in turn has led to the creation of some extremely weak policies and has created a national landscape with considerable variability among districts.

State-Level Influences on School Wellness Policies

In addition to the federal requirements, several states have regulations and policies that influenced the development of SWPs. These regulations contain requirements like setting state-level nutrition standards for à la carte and vending, submitting all policies for review by the Department of Education, and posting all SWPs on a central website. A complete catalog of all state requirements can be found in the National Association of State Boards of Education report *State Strategies to Support Local Wellness Policies* (Pekruhn and Bogden 2007) and the annual Robert Wood Johnson Foundation *Balance* reports (2008).

Another important factor influencing the SWPs' language was the large number of model policies that were created and distributed. At the national level, some of the most frequently discussed model policies were those from the National Alliance for Nutrition and Activity (NANA), the Center for Ecoliteracy, Action for Healthy Kids, and USDA Team Nutrition. Some individual states developed model and sample policies, and many also created tool kits to aid school districts. State-level model policies were likely to have been used the most often because they helped districts ensure compliance with both the federal and their own state regulations. The sources of state-level guidance were most often the state department of education, the state board of education, the

state Action for Healthy Kids team, and universities in the state with departments interested in school nutrition (Pekruhn and Bogden 2007). Note that one risk of creating state model policies is that districts may simply download the language and avoid self-assessment through stakeholder input. This process of working together as a community, however, has been identified as an important way of promoting lasting change (Wechsler et al. 2004).

Evaluating School Wellness Policies

The scientific literature evaluating school wellness policies is just beginning to be written. The national School Nutrition Association (SNA) has taken the lead in evaluating policies and their implementation across the country (SNA 2006a, 2006b, 2008; SNA and School Nutrition Foundation 2007). In 2006, the national SNA released a report examining the policies of the one hundred largest school districts, which was followed by another study of a random sample of 140 districts in seven regions of the country. The findings of these two studies were similar. The majority of written policies (87 percent to 99 percent) addressed the requirements outlined in the law (i.e., setting nutrition standards for school meals, à la carte, and vending, as well as requiring physical activity, nutrition education, and a plan for their implementation and evaluation). Approximately two-thirds of the districts also created nutrition standards for fund-raisers, classroom celebrations and parties, and teachers' use of food as a reward. The SNA studies reported the frequency of breakdown between policies that "mandated" and those that "encouraged" different components. Guidelines for meals, à la carte, and vending were much more likely to be mandated than encouraged, while nutrition standards for fund-raisers, parties, and food as a reward were equally likely to be encouraged as mandated.

In their most recent report, the SNA and the School Nutrition Foundation surveyed food service directors about how many wellness policy components had been implemented to date (SNA 2008; SNA and School Nutrition Foundation 2007). Surveys are a cost-effective method of collecting data, although they carry a risk of inflated estimates of compliance when using self-reported data. The SNA obtained a 28 percent response rate and was able to compare districts based on size, percentage of free and reduced-price lunches requested, and geographic region.

Overall, the SNA found a high level of implementation (92 percent) for reimbursable meal program nutrition standards and a fairly high level (72 percent) for à la carte items. The authors state that their successful implementation may be that they typically are controlled by one person and that the food service is accustomed to following regulations. In contrast, policies regarding other food at school, such as that for fund-raising, class parties, school stores, and food as a reward were much less successful, with only approximately one-third of districts reporting their implementation. This may be due to the challenges in obtaining buy-in from all teachers, parents, and students to follow the standards as well as, perhaps, the difficulty of monitoring these activities. Some interesting trends also emerged regarding the relationship between district size and the percentage of free and reduced-price lunches requested. Specifically, larger districts with more requests for free and reduced-price lunches also appeared to have stronger policies and more successful implementation of their policies. Research using an objective assessment of implementation (e.g., observation) would be useful to validate these findings.

The only published peer-reviewed study to date examines the strength of school wellness policies in thirty districts in Utah (Metos and Nanney 2007). This study found that the majority of districts (78 percent) complied with the federal guidelines regarding policy content, although the strength of the language used in the policies varied widely. Those policy components most likely to be mandated tended to be those already mandated by other laws, suggesting the limited incremental value of the school wellness policy. As the SNA study pointed out, the districts with the strongest language regarding mandatory policy components were those with the most free and reduced-price meal programs. The authors speculate that this may be due to characteristics of the district, such as past attention to the issue or the administrator's experience, and suggest that future research examine such possible predictive factors as the superintendent's experience, previous wellness initiatives, and the school board's or wellness committee's composition and size.

A similar study in Connecticut coded all the state's district policies and looked at a range of potential predictive variables (Schwartz and Henderson 2007). This study also found that districts with low socioeconomic status (SES) had significantly stronger policies than did high-SES districts (Connecticut State Department of Education 2008). When examining predictors of overall policy strength, the district's political

climate was also an independent significant predictor, beyond the effect of SES. Specifically, the greater was the proportion of Democrats to Republicans in the district, the stronger the district policy would be. This finding suggests that local control of policy content may result in policies that are consistent with local political beliefs (Schwartz and Henderson 2007).

Next Steps

One of the challenges in studying SWPs is the lack of a standard measure to assess a policy's strength and comprehensiveness. To address this, a group of researchers funded by the Robert Wood Johnson Foundation's Healthy Eating Research program created a ninety-six-item measure to code the policies on a large number of items under each of the major domains: nutrition education, nutrition standards for school lunch, nutrition standards for competitive foods, physical education, physical activity, and communication and promotion (Schwartz et al. in press). This measure is conceptually similar to those used by the SNA (2006a, 2006b) and by Metos and Nanney (2007), in that it distinguishes between weak and strong language but builds on these measures by including a large number of items to cover as many components of key policy domains as possible.

Conclusions: What Is Needed to Accelerate Change

Research consistently shows that the majority of American children do not consume diets that meet the Dietary Guidelines for Americans, nor do they achieve the recommended levels of daily physical activity. As a result, more children in the United States are overweight today than at any other time in its history. Obesity prevention efforts need to begin early, focusing on children and families and the environments in which they live, such as home, schools, and communities. Schools can help in the fight against obesity by creating environments conducive to healthful eating and physical activity. The CDC has identified what it believes to be the ten most promising school policies and practices to address childhood obesity (Wechsler et al. 2004):

- Address physical activity and nutrition through a coordinated school health program.
- Designate a school health coordinator, and maintain an active school health council.
- Assess the school's health policies and programs, and develop a plan for improvement.
- Strengthen the school's nutrition and physical activity policies.
- Offer a high-quality health promotion program for the school's staff.
- Offer a high-quality course of study in health education.
- Offer a high-quality course of study in physical education.
- Increase opportunities for students to engage in physical activity.
- Offer a quality school meals program.
- Ensure that students have appealing, healthy choices in foods and beverages offered outside the school meals program.

If schools can work together with policymakers, advocates, parents, and communities to create an environment where children eat healthfully, become physically fit, and develop lifelong habits that contribute to wellness, the nation could be well on its way to preventing obesity (Story, Kaphingst, and French 2006).

Policy decisions that influence school environments are made at many levels, including state law, state board of education policy, local school board policy, and other state regulatory and licensing requirements (Rosenthal and Chang 2004). Policy and legislative initiatives at the national, state, and local levels are needed to develop and support healthful food and physical activity behaviors that will promote energy balance and a healthy body weight. The states should establish policies that increase the amount of time children spend in physical education and improve the quality of this physical education. Strong policies are needed for nutrition standards for all foods available during the school day. The school lunch and breakfast programs should be the main source of nutrition at school, and opportunities for competitive foods should be limited. But if they are available, they should consist of only nutritious foods. Statewide school BMI surveillance and monitoring systems are needed in order to establish baseline rates and track population trends of obesity and to determine whether policies, programs, and services are in fact reducing childhood obesity.

In addition to state and local initiatives, we need stronger federal policies. Congress should authorize the USDA to establish and enforce regulations for all foods and beverages sold or served in schools that participate in the National School Lunch Program. Unhealthy foods have no place in schools. Haskins, Paxson, and Donahue (2006) observed that because local education agencies receive substantial amounts of federal aid each year—\$10 billion in FY 2007—to run their food programs, there is little doubt that Congress could rule that schools that do not comply with limiting high-calorie, low-nutrition competitive foods would be ineligible to receive federal dollars for school lunch and breakfast programs. If Congress enacted such a rule, the presence of competitive foods and beverages in the nation's schools would instantly disappear (Haskins, Paxson, and Donahue 2006).

More efforts and resources should be devoted to policy and implementation efforts at the federal, state, and local levels. Finally, we need research funding to create and evaluate innovative obesity prevention pilot interventions in schools, using behavioral, environmental, and policy change strategies. In the past five years, schools have been making progress and moving in the right direction. Both children and the nation will benefit if schools push even more aggressively in the direction in which they are already moving (Haskins, Paxson, and Donahue 2006). To do this, we need a coordinated and systematic plan and the political will to place a priority on children's health and well-being.

References

- Center for Science in the Public Interest. 2007. *State School Foods Report Card 2007, November*. Available at <http://www.cspinet.org/2007schoolreport.pdf> (accessed October 27, 2008).
- Centers for Disease Control and Prevention. 2007a. *School Health Policies and Programs Study 2006: Changes between 2000 and 2006*. Atlanta: U.S. Department of Health and Human Services. Available at http://www.cdc.gov/healthyyouth/shpps/2006/factsheets/pdf/FS_Trends_SHPPS2006.pdf (accessed October 10, 2008).
- Centers for Disease Control and Prevention. 2007b. *State-Level School Health Policies and Practices: A State-by-State Summary from the School Health Policies and Programs Study 2006*. Atlanta: U.S. Department of Health and Human Services. Available at <http://www.cdc.gov/>

- HealthyYouth/shpps/2006/summaries/pdf/State_Level_Summaries_SHPPS2006.pdf (accessed October 10, 2008).
- Connecticut State Department of Education. 2008. *School Wellness Policy Report: Data Summary 1*. Available at <http://www.sde.ct.gov/sde/cwp/view.asp?a=2626&q=322168> (accessed October 27, 2008).
- Cullen, K.W., J. Eagan, T. Baranowski, E. Owens, and C. de Moor. 2000. Effect of à la Carte and Snack Bar Foods at School on Children's Lunchtime Intake of Fruits and Vegetables. *Journal of the American Dietetic Association* 100(12):1482–86.
- Cullen, K.W., and D.I. Thompson. 2005. Texas School Food Policy Changes Related to Middle School à la Carte / Snack Bar Foods: Potential Savings in Kilocalories. *Journal of the American Dietetic Association* 105(12):1952–54.
- Cullen, K.W., K. Watson, I. Zakeri, and K. Ralston. 2006. Exploring Changes in Middle-School Student Lunch Consumption after Local School Food Service Policy Modifications. *Public Health Nutrition* 9(6):814–20.
- Cullen, K.W., and I. Zakeri. 2004. Fruits, Vegetables, Milk, and Sweetened Beverages Consumption and Access to à la Carte / Snack Bar Meals at School. *American Journal of Public Health* 94(3):463–67.
- Finkelstein, D.M., E.L. Hill, and R.C. Whitaker. 2008. School Food Environments and Policies in US Public Schools. *Pediatrics* 122(1):e251–e259.
- Fox, M.K., M.K. Crepinsek, P. Connor, and M. Battaglia. 2001. *School Nutrition Dietary Assessment Study-II: Summary of Findings*. USDA, Food and Nutrition Service, Report no. CN-01-SND AII, April. Available at <http://www.fns.usda.gov/OANE/MENU/Published/CNP/FILES/SND AIIfind.pdf> (accessed October 27, 2008).
- Frumkin, H. 2006. Introduction: Safe and Healthy School Environments. In *Safe and Healthy School Environments*, edited by H. Frumkin, R.J. Geller, I.L. Rubin, and J. Nodvin, pp. 3–10. New York: Oxford University Press.
- Gleason, P., and C. Suitor. 2001. *Food for Thought: Children's Diets in the 1990s*. Princeton, N.J.: Mathematica Policy Research.
- Gordon, A., M.K. Crepinsek, R. Nogales, and E. Condon. 2007. *School Nutrition Dietary Assessment Study-III*, vol. 1, School Food Service, School Food Environment, and Meals Offered and Served. Princeton, N.J.: Mathematica Policy Research.
- Gordon, A., and M.K. Fox. 2007. *School Nutrition Dietary Assessment Study-III: Summary of Findings*, November. Available at <http://www.fns.usda.gov/oane/menu/Published/CNP/FILES/SND AIII-SummaryofFindings.pdf> (accessed October 27, 2008).

- Hartstein, J., K.W. Cullen, K.D. Reynolds, J. Harrell, K. Resnicow, and P. Kennel. 2008. Impact of Portion-Size Control for School à la Carte Items: Changes in Kilocalories and Macronutrients Purchased by Middle School Students. *Journal of the American Dietetic Association* 108(1):140–44.
- Haskins, R., C. Paxson, and E. Donahue. 2006. *Fighting Obesity in the Public Schools*. Princeton, N.J.: The Future of Children.
- Institute of Medicine (IOM). 2005. *Preventing Childhood Obesity: Health in the Balance*. Washington, D.C.: National Academies Press.
- Institute of Medicine (IOM). 2007. *Nutrition Standards for Foods in Schools: Leading the Way toward Healthier Youth*. Washington, D.C.: National Academies Press.
- Joshi, A., A. Misako Azuma, and G. Feenstra. 2008. Do Farm to School Programs Make a Difference? Findings and Future Research Needs. *Journal of Hunger & Environmental Nutrition* 3(2/3):229–46.
- Justus, M.B., K.W. Ryan, J. Rockenbach, C. Katterapalli, and P. Card-Higginson. 2007. Lessons Learned While Implementing a Legislated School Policy: Body Mass Index Assessments among Arkansas's Public School Students. *Journal of School Health* 77(10):706–13.
- Kann, L., S.K. Telljohann, and S.F. Wooley. 2007. Health Education: Results from the School Health Policies and Programs Study 2006. *Journal of School Health* 77(8):408–34.
- Kubik, M.Y., J.A. Fulkerson, M. Story, and G. Rieland. 2006. Parents of Elementary School Students Weigh in on Height, Weight, and Body Mass Index Screening at School. *Journal of School Health* 76(10):496–501.
- Kubik, M.Y., L.A. Lytle, P.J. Hannan, C.L. Perry, and M. Story. 2003. The Association of the School Food Environment with Dietary Behaviors of Young Adolescents. *American Journal of Public Health* 93(7):1168–73.
- Kubik, M.Y., L.A. Lytle, and M. Story. 2005. Schoolwide Food Practices Are Associated with Body Mass Index in Middle School Students. *Archives of Pediatrics & Adolescent Medicine* 159:1111–14.
- Kubik, M.Y., M. Story, and G. Rieland. 2007. Developing School-Based BMI Screening and Parent Notification Programs: Findings from Focus Groups with Parents of Elementary School Students. *Health Education & Behavior* 34(4):622–33.
- Lee, S.M., C.R. Burgeson, J.E. Fulton, and C.G. Spain. 2007. Physical Education and Physical Activity: Results from the School Health Policies and Programs Study 2006. *Journal of School Health* 77(8):435–63.
- Lytle, L.A., D.M. Murray, C.L. Perry, M. Story, A.S. Birnbaum, M.Y. Kubik, and S. Varnell. 2004. School-Based Approaches to Affect

- Adolescents' Diets: Results from the TEENS Study. *Health Education & Behavior* 31(2):270–87.
- Mahar, M., S. Murphy, D. Rowe, J. Golden, T. Shields, and T. Raedeke. 2006. Effects of a Classroom-Based Program on Physical Activity and On-Task Behavior. *Medicine & Science in Sports & Exercise* 38(12):2086–94.
- Marsh, H.W. 1992. Extracurricular Activities: A Beneficial Extension of the Traditional Curriculum or a Subversion of Academic Goals? *Journal of Educational Psychology* 84(4):553–62.
- Martin, J. 2008. Overview of Federal Child Nutrition Legislation. In *Managing Child Nutrition Programs: Leadership for Excellence*, 2nd ed., edited by J. Martin and C.B. Oakley, pp. 145–99. Sudbury, Mass.: Jones and Bartlett.
- Menschik, D., S. Ahmed, M.H. Alexander, and R.W. Blum. 2008. Adolescent Physical Activities as Predictors of Young Adult Weight. *Archives of Pediatrics & Adolescent Medicine* 162(1):29–33.
- Metos, J., and M.S. Nanney. 2007. The Strength of School Wellness Policies: One State's Experience. *Journal of School Health* 77(7):367–72.
- Miller, C.H. 2009. A Practice Perspective on the Third School Nutrition Dietary Assessment Study. *Journal of the American Dietetic Association* 109(2):S14–S17.
- National Alliance for Nutrition and Activity. 2008. *Update USDA's School Nutrition Standards: Cosponsor the Child Nutrition Promotion and School Lunch Protection Act*. Available at <http://www.cspinet.org/nutritionpolicy/fedschoolfoods.pdf> (accessed October 27, 2008).
- National Association for Sport and Physical Education. 2001. *Recess in Elementary Schools: A Position Paper*. Council on Physical Education for Children, July. Available at http://www.aahperd.org/naspe/pdf_files/pos_papers/current_res.pdf (accessed October 10, 2008).
- National Association for Sport and Physical Education (NASPE) and American Heart Association (AHA). 2006. *Shape of the Nation Report: Status of Physical Education in the USA*. Reston, Va.
- Neumark-Sztainer, D., S.A. French, P.J. Hannan, M. Story, and J.A. Fulkerson. 2005. School Lunch and Snacking Patterns among High School Students: Associations with School Food Environment and Policies. *International Journal of Behavioral Nutrition and Physical Activity* 2(1):14. doi:10.1186/1479-5868-2-14.
- Nihiser, A.J., S.M. Lee, H. Wechsler, M. McKenna, E. Odom, C. Reinold, D. Thompson, and L. Grummer-Strawn. 2007. Body Mass Index Measurement in Schools. *Journal of School Health* 77(10):651–71; quiz 722-654.

- O'Toole, T.P., S. Anderson, C. Miller, and J. Guthrie. 2007. Nutrition Services and Foods and Beverages Available at School: Results from the School Health Policies and Programs Study 2006. *Journal of School Health* 77(8):500–521.
- Ozer, E.J. 2007. The Effects of School Gardens on Students and Schools: Conceptualization and Considerations for Maximizing Healthy Development. *Health Education & Behavior* 34(6):846–63.
- Pekruhn, C.E., and J.F. Bogden. 2007. *Issue Brief: State Strategies to Support Local Wellness Policies*. Alexandria Va.: National Association of State Boards of Education.
- Robert Wood Johnson Foundation. 2008. A Report on State Action to Promote Nutrition, Increase Physical Activity and Prevent Obesity. *Balance* (5, 2007 End of Year Report).
- Rosenthal, J., and D. Chang. 2004. *State Approaches to Childhood Obesity: A Snapshot of Promising Practices and Lessons Learned*. Portland, Maine: National Academy for State Health Policy, April.
- School Nutrition Association (SNA). 2006a. *A Foundation for the Future: Analysis of Local Wellness Policies from the 100 Largest School Districts*, October. Available at <http://www.schoolnutrition.org/Content.aspx?id=8504> (accessed June 19, 2008).
- School Nutrition Association (SNA). 2006b. *A Foundation for the Future: Analysis of Local Wellness Policies from the 140 Districts in 49 States*, December. Available at <http://www.schoolnutrition.org/Content.aspx?id=8504> (accessed June 19, 2008).
- School Nutrition Association (SNA). 2008. *A Matter of Standards: 2008 Legislative Issue Paper*. Available at http://www.schoolnutrition.org/uploadedFiles/School_Nutrition/106_LegislativeAction/SNA_PositionStatements/IndividualPositionStatements/SNA.Final.IP.2008.pdf (accessed June 23, 2008).
- School Nutrition Association (SNA) and School Nutrition Foundation. 2007. *From Cupcakes to Carrots: Local Wellness Policies One Year Later*, September. Available at <http://www.schoolnutrition.org/Content.aspx?id=8504> (accessed June 19, 2008).
- Schwartz, M.B., and K.E. Henderson. 2007. Macro-Level Predictors of School Wellness Policies in Connecticut. Paper presented at the annual Healthy Eating Research Meeting, Minneapolis.
- Schwartz, M.B., A.E. Lund, H.M. Grow, E. McDonnell, C. Probart, A. Samuelson, and L. Lytle. In press. A Comprehensive Coding System to Measure the Quality of School Wellness Policies. *Journal of the American Dietetic Association*.
- Smith, R. 2006. Passing an Effective Obesity Bill. *Journal of the American Dietetic Association* 106(9):1349–53.

- Story, M., K.M. Kaphingst, and S. French. 2006. The Role of Schools in Obesity Prevention. *Future Child* 16(1):109–42.
- Trudeau, F., and R.J. Shephard. 2008. Physical Education, School Physical Activity, School Sports and Academic Performance. *International Journal of Behavioral Nutrition and Physical Activity* 5:10. doi:10.1186/1479.
- Trust for America's Health. 2007. *F as in Fat: How Obesity Policies Are Failing in America, 2007*. Available at <http://healthyamericans.org/reports/obesity2007/Obesity2007Report.pdf> (accessed June 20, 2008).
- U.S. Department of Agriculture (USDA), Economic Research Service. 2008. *The Food Assistance Landscape: FY 2007 Annual Report*. Economic Information Bulletin no. 6-5. Washington, D.C.
- U.S. Department of Agriculture (USDA), Food and Nutrition Service. 1988. *7CFR Part 210—National School Lunch Program*. Available at www.fns.usda.gov/cnd/governance/regulations/7CFR210.pdf (accessed October 22, 2008).
- U.S. Department of Agriculture (USDA), Food and Nutrition Service, Office of Research, and Nutrition and Analysis. 2008. *School Lunch and Breakfast Cost Study-II, Final Report*, April. Available at <http://www.fns.usda.gov/oane/menu/Published/CNP/FILES/MealCostStudy.pdf> (accessed October 27, 2008).
- U.S. Department of Health and Human Services. 2001. *The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity*. Rockville, Md.: U.S. Department of Health and Human Services, Public Health Service, Office of the Surgeon General.
- U.S. Department of Health and Human Services. 2006. *Healthy People 2010 Midcourse Review: Physical Activity and Fitness Goal*, chap. 22. Available at <http://www.healthypeople.gov/data/midcourse/pdf/fa22.pdf> (accessed October 10, 2008).
- U.S. General Accounting Office. 2003. *School Meal Programs: Revenue and Expense Information from Selected States*. Report no. GAO-03-569. Washington, D.C.
- Wagner, B., B. Senauer, and C.F. Runge. 2007. An Empirical Analysis of and Policy Recommendations to Improve the Nutritional Quality of School Meals. *Review of Agricultural Economics* 29(4):672–88.
- Weber, J.A. 2008. Increasing Food Costs for Consumers and Food Programs Straining Pocketbooks. *Journal of the American Dietetic Association* 108(4):615–17.
- Wechsler, H., M.L. McKenna, S.M. Lee, and W.H. Dietz. 2004. The Role of Schools in Preventing Childhood Obesity. *State Education Standard* 5:4–12.
- Wharton, C.M., M. Long, and M.B. Schwartz. 2008. Changing Nutrition Standards in Schools: The Emerging Impact on School Revenue. *Journal of School Health* 78(5):245–51.