



The Role of Schools in Preventing Childhood Obesity

The childhood obesity epidemic is one of the major public health, social, and economic challenges of the 21st century. Consequences of this epidemic include increased risk for chronic diseases, social and psychological problems among young people, and high health care costs. Physical activity and eating behaviors that affect the childhood obesity epidemic are influenced by many sectors of society, including families, community organizations, health care providers, faith-based institutions, government agencies, the media, and schools. While schools cannot solve the problem alone, they have a unique role to play in addressing childhood obesity. This paper summarizes data on overweight among young people, describes 10 evidence-based strategies schools can use to improve student nutrition and physical activity, and addresses challenges to improvement.

Overweight among Children and Adolescents

Since 1980, the percentage of children who are overweight has more than doubled, while rates among adolescents have more than tripled (Ogden et al., 2002; Hedley et al., 2004; Ogden et al., 2006). In 2004, 18.8% of 6- to 11-year-old children were overweight, and 17.4% of 12- to 19-year-old adolescents were overweight (Ogden et al., 2006). Sixteen percent of female children and adolescents, compared with 18.2% of male children and adolescents, were considered overweight (Ogden et al., 2006). While the rates of overweight have risen dramatically for all racial and ethnic groups, the epidemic has disproportionately affected minority populations. The rates of overweight are highest in non-Hispanic black girls (23.8%) and Mexican-American boys (22.0%) (Ogden et al., 2006).

Published quarterly by the
President's Council on
Physical Fitness and Sports
Washington, D.C.



Guest Authors:

Sarah M. Lee is physical activity specialist, Howell Wechsler is director, and Allison Balling is obesity prevention specialist at the Division of Adolescent and School Health, National Center for Chronic Disease Prevention and Health Promotion, U.S. Centers for Disease Control and Prevention.



Co-edited by:

Dr. Deborah Young, University of Maryland, Dr. Robert P. Pangrazi, Arizona State University, and Dr. Barbara Ainsworth, Arizona State University

Childhood overweight is related to numerous health problems, including high blood pressure, high cholesterol, and impaired fasting glucose (a prediabetic state) (Burke et al., 2005; Ribeiro et al., 2003; Williams et al., 2005). A community-based study found that 61% of overweight young people had at least one risk factor for heart disease, such as high cholesterol or high insulin (Freedman et al., 1999). Type 2 diabetes was almost unknown 20 years ago among young people, but now accounts for nearly 50% of new cases of pediatric diabetes in some communities (Fagot-Campagna, 2000). Nationally, the current prevalence of impaired fasting glucose among youth aged 6-19 is 7%; that number increases to 18% among overweight youth (Williams et al., 2005). In addition to physical conditions, childhood overweight is associated with social and psychological problems such as discrimination and poor self-esteem (Eisenberg, Neumark-Sztainer, and Story, 2003; Schwimmer, Burwinkle, and Varni, 2003; Strauss and Pollack, 2003).

Rising rates of overweight among children is particularly worrisome because children and adolescents who are overweight are more likely to become overweight and obese adults (U.S. Department of Health and Human Services [USDHHS], 2001). Obesity in adults is associated with an increased risk of premature death, heart disease, type 2 diabetes, stroke, several types of cancer, osteoarthritis, and many other health problems (USDHHS, 2001).

The obesity epidemic also jeopardizes the future economic competitiveness and military security of our nation. In 2000, the total cost of obesity (including medical costs and the value of wages lost) in the United States was

approximately \$117 billion (USDHHS, 2001). With the Centers for Disease Control and Prevention (CDC) estimating that more than one in three children born in 2000 will eventually suffer from diabetes (Narayan et al., 2003), the future costs of weight-related health care could be staggering. U.S. military leaders have warned that the childhood obesity epidemic threatens our national security, because the high prevalence of overweight among young adults reduces the number of recruits who are eligible for service (Marchione, 2005).

The Role of Schools

The essential cause of the increase in overweight among children and adolescents is caloric imbalance, which results from inadequate physical activity, poor dietary choices, or both. These behaviors are influenced by many sectors of society, including families, community organizations, health care providers, faith-based institutions, government agencies, the media, and schools. None of these sectors can solve the childhood obesity epidemic on its own; however it is unlikely to be solved without strong school-based policies and programs. Schools play an especially important role because over 95% of young people are enrolled in schools (National Center for Education Statistics, 2005). Additionally, the promotion of physical activity and healthy eating in schools has long been a part of education, and research has shown that well-designed, well-implemented programs can effectively promote these behaviors (Centers for Disease Control and Prevention [CDC], 1996; CDC, 1997; Gortmaker et al., 1999; Robinson, 1999).

Evidence-based Strategies for Schools

School-based childhood overweight prevention research is still in its infancy; the few

TABLE 1. RESOURCES TO ASSIST SCHOOLS WITH IMPLEMENTING THE 10 KEY STRATEGIES
Coordinated School Health Program
<i>Coordinated School Health Program (CSHP).</i> Definitions, descriptions, and guidance for implementing a CSHP are available on the CDC website. www.cdc.gov/healthyyouth/CSHP
School Health Coordinator and School Health Council
<i>Promoting Healthy Youth, Schools, and Communities: A Guide to Community-School Health Councils.</i> A practical guide to planning, developing, maintaining, and evaluating School Health Councils from the American Cancer Society. www.schoolhealth.info (Click on <i>School Health Advisory Councils</i>)
Assess School Health Policies and Programs
<i>School Health Index.</i> A user-friendly tool from CDC that schools can use to self-assess their health policies and practices and plan for improvements. www.cdc.gov/healthyyouth/shi
<i>Wellness Policy Tool.</i> This tool on the Action for Healthy Kids website provides information on how to create, implement, and evaluate wellness policies. www.actionforhealthykids.org
<i>Local Wellness Policy.</i> Background information and guidance for school districts on how to comply with the federal requirement to develop wellness policies is available on the USDA’s Food and Nutrition Service website. www.fns.usda.gov/tn/healthy/wellnesspolicy.html
Health Education
<i>Health Education Curriculum Analysis Tool (HECAT).</i> This tool from CDC helps educators select curricula that best meet the health education needs of students. Available in late 2006. www.cdc.gov/healthyyouth
Physical Education
<i>Physical Education Curriculum Analysis Tool (PECAT).</i> This tool from CDC helps educators assess how well physical education curricula reflect the national physical education standards. www.cdc.gov/healthyyouth/PECAT
Physical Activity
<i>KidsWalk-to-School.</i> A manual from CDC that provides guidance for schools and communities on how to create an environment that supports safe walking and bicycling to school. www.cdc.gov/nccdphp/dnpa/kidswalk
School Meals Program
<i>Changing the Scene: Improving the School Nutrition Environment.</i> A tool kit from the U.S. Department of Agriculture that provides guidance on implementing a comprehensive school program to promote healthy eating. www.fns.usda.gov/tn/resources/changing.html
Healthy Eating Outside of the School Meals Program
<i>Making It Happen: School Nutrition Success Stories.</i> This resource highlights six strategies for schools to improve their nutrition environments and case studies of 32 schools and school districts that have successfully implemented the strategies (from the U.S. Departments of Agriculture, Health and Human Services [CDC], and Education). www.cdc.gov/healthyyouth/nutrition/making-it-happen

interventions to date that have evaluated weight status as a primary outcome have produced mixed results (Luepker et al., 1996; Gortmaker et al., 1999; Robinson, 1999). More meaningful findings should emerge over the next decade. In the meantime, a larger body of evidence documents the effectiveness of school-based physical activity and nutrition interventions, policies, and practices that address childhood overweight. CDC has published guidelines that identify school policies and practices most likely to be effective in promoting lifelong physical activity and healthy eating (CDC, 1996; CDC, 1997). Updated versions of these guidelines will be released in 2007; however, the fundamental conclusions will remain consistent. Based on comprehensive reviews of the research literature and extensive input from academic experts and school health practitioners, the guidelines contain many recommendations. These recommendations are summarized in the following 10 evidence-based strategies. It may not be feasible to implement all of these strategies at once, but the more strategies a school addresses, the more profound an impact it is likely to have. A list of sample resources to help schools implement these strategies is found in Table 1.

1. Address physical activity and nutrition through a Coordinated School Health Program (CSHP).

A CSHP is a planned, sequential, and integrated set of courses, services, policies, and interventions designed to meet the health and safety needs of K-12 students. It features efforts to improve the quality and interconnectedness of eight school components—health education; physical education; health services; nutrition services; counseling, psychological, and social services; a healthy and safe environment; parent/community involvement; and staff wellness. A successful and well-coordinated school health program is characterized by administrators, teachers, and school board members who view health protection and promotion as an essential part of the school’s mission. The CSHP approach guides education agencies in most states, and is funded by CDC in 23 state education agencies (CDC, n.d.).

Pate and colleagues (2005) used the CSHP approach to design a program specifically promoting physical activity among high school girls. Intervention schools implemented the intervention through six main components of CSHP: physical education, health education, health services, family and community involvement, school environment, and health promotion for staff. Participation in regular vigorous physical activity was higher among students enrolled in the intervention schools than those in the control schools.

2. Designate a school health coordinator and maintain an active school health council (SHC).

A school health coordinator is responsible for managing and coordinating all school health policies, programs, activities, and resources. SHCs guide school health coordinators and school administrators on school health activities and policies to create a healthy school environment (American Cancer Society, 1999). SHCs comprise individuals representing different segments of the school and community, including teachers, school administrators, students, parents, and community leaders (Shirer, 2003).

SHCs have helped strengthen physical education and health education curricula, and implement sustainable changes in school environments, such as establishing walking programs for staff and students, adopting nutrition standards, and opening school facilities for after-school physical activity programs (Food and Nutrition Service, 2005; CDC, 2003). The state-level school health policy tracking service of the National Association of State Boards of Education (NASBE) reports that 29 states have policies supporting SHCs (National Association of State Boards of Education [NASBE], n.d.). For example, Florida, North Carolina, Oklahoma, and Texas require that school districts form health councils.

3. Assess the school’s health policies and programs and develop a plan for improvement.

A plan for improving physical activity and healthy eating opportunities within schools should begin with an assessment of current policies and practices. Schools can use CDC’s *School Health Index: A Self-Assessment and Planning Guide* (SHI) to identify strengths and weaknesses of current health policies and practices and establish plans for improving physical activity and healthy eating opportunities for students (CDC, 2005). The tool focuses on school activities related to physical activity, nutrition, tobacco, injury prevention, and asthma.

Schools in at least 46 states have reported using the SHI, with several states reporting use by hundreds of schools. Completing the SHI can lead to positive changes in the school health environment: for example, schools have hired a physical education teacher for the first time, added healthier food choices, and incorporated structured fitness breaks into the school day (Staten et al., 2005; Austin, Fung, Cohen-Bearak, Wardle, & Cheung, 2006). Various state and local health departments offer mini-grants to schools that complete the SHI and implement changes. For example, the Michigan Department of Community Health, in collaboration with the Michigan Department of Education and Michigan State University Extension,

offered grants of \$1,000 to support 47 schools for completing the SHI and targeting one priority area during the 2002-2003 academic year (Michigan Department of Education, 2005).

4. Strengthen the school's physical activity and nutrition policies.

The nine other strategies outlined here require as their foundation the adoption of policies at the school district, state, or federal level. Schools must also keep staff, parents, and students informed of policies to ensure support. A number of states have initiated the trend of establishing policies to create a school climate that supports student and staff health. California, for example, founded California Project LEAN (Leaders Encouraging Activity and Nutrition) to establish policy and environmental changes that promote physical activity and healthy eating (California Department of Health Services and Public Health Institute, n.d.). In 2003, Grand Forks Public Schools in North Dakota used their findings from a SHI assessment and passed a board policy on nutrition education practices to assure consistent nutrition messages from the classroom to the cafeteria (Food and Nutrition Service, 2005).

At the federal level, legislation passed through the Child Nutrition and WIC Reauthorization Act of 2004 requires every school district participating in the federal school meals program to have a wellness policy that addresses physical activity and nutrition by June 30, 2006 (Child Nutrition and WIC Reauthorization Act of 2004). These policies should aim to create a school environment that encourages sound nutrition and physical activity (NASBE, 2000). The School District of Pittsburgh defined its wellness policy around the eight components of coordinated school health (School District of Pittsburgh, 2005). The policy includes guidelines for a planned, sequential, preschool-grade 12 physical education curriculum as well as nutrition standards for competitive foods sold in school (School District of Pittsburgh, 2005).

5. Implement a high-quality school employee wellness program.

School employee wellness (SEW) programs can improve staff morale, attendance, and overall performance (Allegrante, 1998), as well as reduce expenditures for employee health care (Aldana, 2001). They also can make important contributions to student health by giving staff skills and motivation they need to become powerful role models for good health. To create a meaningful SEW program, a school employee wellness committee should assess staff needs and the school environment (Valois, 1999; Galemore, 2000). SEW programs typically include screenings to

identify chronic disease risk factors (e.g., high blood pressure, high cholesterol), health education classes, organizational policies that support worksite health promotion, and employee assistance programs (Grunbaum, Rutman, and Sathrum, 2001). Some schools offer a variety of activities that can benefit all staff (e.g., walking clubs, nutrition counseling), but other schools may choose to offer programs that are specific to the needs and health risks prevalent in their school community (e.g., high blood pressure) (Partnership for Prevention, 2001; Hyde and Guthrie, 1993). SEW programs for physical activity and healthy eating should emphasize behavioral skills, such as self-assessment and self-monitoring of activity and eating habits (Chan, Ryan, and Tudor-Locke, 2004; White and Ransdell, 2003).

6. Implement a high-quality health education course of study.

Sophisticated health education features a sequential curriculum consistent with state or national health education standards (Joint Committee on National Health Education Standards, 1995) and adequate amounts of instructional time. To address childhood overweight, health education curricula should emphasize strategies for increasing physical activity and healthy eating (CDC, 1996; CDC, 1997) and reducing television viewing time (Gortmaker et al., 1999; Robinson, 1999). Three-fourths of elementary, middle, and high schools currently include dietary behavior and physical activity topics within their health education curriculum (Kann, Brener, and Allensworth, 2001).

Curricula that emphasize factual information without incorporating skill development are less likely to change students' health behaviors (CDC, 1996; CDC, 1997; Contento et al., 1995). Curricula are more likely to improve health behaviors when they teach skills needed to adopt healthy behaviors, provide ample opportunities to practice these skills, and help students overcome barriers to adopting behaviors. Students who participated in an elementary school curriculum intervention that emphasized self-monitoring, behavior change, and media literacy for television viewing reduction watched less television and lowered their body mass index (BMI) significantly (Robinson, 1999). The Planet Health intervention educated middle school students on physical activity, nutrition, and sedentary behaviors by integrating health education into core subjects. The intervention effectively reduced television viewing among both boys and girls. Further, girls who received the 2-year intervention reported greater consumption of fruits and vegetables and had a lower prevalence of overweight than girls in the control group (Gortmaker et al., 1999).

7. Implement a high-quality physical education course of study.

High-quality physical education provides the opportunity for young people to learn knowledge and skills needed to establish and maintain physically active lifestyles throughout childhood and into adulthood. A high-quality physical education program 1) is an enjoyable experience for students and meets their needs, 2) keeps students active for most of physical education class time, 3) teaches self-management as well as movement skills, and 4) emphasizes knowledge and skills for a lifetime of physical activity (National Association for Sport and Physical Education [NASPE], 2004; Task Force on Community Preventive Services, 2002). Like other academic courses of study, physical education should be based upon rigorous national standards that define what physically educated students should know and be able to do (NASPE, 2004).

Participating in enhanced school-based physical education courses (courses that increase time for physical education and change instructional methods to increase active time during physical education class) not only increases the amount and intensity of children's daily physical activity, but also improves their physical fitness (Task Force on Community Preventive Services, 2002). Current physical activity recommendations stress that youth ages 6-19 should accumulate at least 60 minutes of daily physical activity (USDHHS, 2005; Strong et al., 2005). Because children spend the majority of their day at school, they should be given the opportunity to participate in at least 30 minutes of the recommended amount during each school day (Institute of Medicine of the National Academies, 2004), and a daily physical education course can help them meet this recommendation (NASPE, 2004; USDHHS, 2000). A high-quality course requires adequate time (i.e., at least 150 minutes per week for elementary schools and 225 for secondary schools), adequately prepared teachers (including opportunities for professional development), adequate facilities, and reasonable class sizes.

The Sports, Play, and Active Recreation for Kids (SPARK) physical education intervention included 30 minutes of physical education focusing on skill-related and health-related fitness (Sallis et al., 1997). Classes were taught by physical education specialists over a 2-year period. Students in this program participated in more moderate and vigorous physical activity during physical education class than students who were not taught by a specialist or were not enrolled in the program. Additionally, the authors reported that increasing time for SPARK physical education throughout the school week did not negatively impact

academic achievement of participating students (Sallis et al., 1999).

8. Increase opportunities for students to engage in physical activity.

The school setting offers multiple opportunities for students to enjoy physical activity outside of physical education class. A comprehensive school-based physical activity program includes quality physical education, recess, intramurals, interscholastic sports, staff wellness, and walk- and bicycle-to-school initiatives (NASPE, 2005). Such opportunities enable students to apply the knowledge and skills learned in physical education. Although some school districts have stopped offering it, most elementary schools continue to provide a daily recess period of at least 20 minutes (Burgeson et al., 2001). Studies have shown that during recess, young people can accumulate up to 20 minutes of their recommended 60 minutes of daily physical activity, with the majority engaging in moderate physical activity (Ridgers, Stratton, and Fairclough, 2005). Many teachers also are now incorporating periodic breaks for physical activity as part of classroom lessons (Michigan Department of Education, n.d.; Stewart et al., 2004).

Intramural programs have broadened to encompass physical activity clubs, open gym, and dance activities. Noncompetitive lifetime physical activities such as walking, running, hiking, tennis, and dancing should be included to offer a wide range of options for young people (National Association for Sport and Physical Education, n.d.). The development and promotion of walk- and bicycle-to-school programs have become more popular among young people. Some studies indicate that children who walk or bicycle to school participate in more overall physical activity and have lower BMIs than those who are driven to school (Cooper, 2005; Tudor-Locke, et al., 2002). A promising approach to developing and promoting walk- and bicycle-to-school programs is helping communities overcome obstacles to create a safer environment within 1 mile of the school. Schools that are making changes to the built environment have seen increases in the prevalence of students walking and bicycling to school (Staunton, Hubsmith, and Kallins, 2003).

9. Implement a quality school meals program.

Currently, 29 million students participate in the National School Lunch Program (NSLP), and 9 million participate in the School Breakfast Program each day (USDA, 2006). Since 1996, when schools were required to serve meals that are consistent with the Dietary Guidelines for Americans, schools have reduced levels of fat and saturated fat in school meals, while continuing to meet federal standards for energy and key nutrients (Fox et al., 2001). A study of

elementary school students found that those participating in the NSLP had greater intake of fruits and vegetables than those who ate from the snack bar or brought their lunch from home (Cullen et al., 2000).

Schools can support a high-quality meal program by providing enough time to eat and a safe, clean, and pleasant area to eat; ensuring that meals meet students' cultural preferences; promoting healthy foods to students in the cafeteria; promoting healthy school meal choices to families through menus and newsletters; and linking to the core nutrition education curriculum (Position of the American Dietetic Association, Society for Nutrition Education, and American School Food Service Association, 2003). It is important that food service personnel are trained appropriately and have opportunities for professional development. Most states and districts, however, have minimal or no educational requirements for school food service managers, and only a handful of states require them to be certified (Wechsler, 2001).

10. Ensure that students have appealing, healthy choices in foods and beverages offered outside of the school meals program.

Most schools offer foods and beverages to students through a variety of channels outside of the federally regulated school meal program: à la carte items in the cafeteria, vending machines, school stores, concession stands, after-school programs, fundraising sales, and class parties. States vary with 60% to 95% of high schools allowing students to purchase snack foods or beverages from vending machines or at a school store (Kann et al., 2005). In a study of 16 high schools in Minnesota, greater opportunities to consume snack food and beverages in schools was associated with higher BMI among students (Kubik, Lytle, and Story, 2005)

Currently, the federal government does not prohibit schools from selling many high-fat or high-sugar products, such as chocolate bars, potato chips, doughnuts, and fruit drinks (USDA, 1994; USDA 2001). States, school districts, and schools, however, can establish their own regulations, and many are doing so. *Making It Happen: School Nutrition Success Stories* (Food and Nutrition Service, 2005) showcases 32 schools and school districts across the country for their efforts to improve nutrition environments. Main strategies included 1) making healthful foods and beverages available, 2) influencing food and beverage contracts, 3) establishing nutrition standards, 4) marketing healthful choices, 5) limiting access to non-meal foods and beverages at school, and 6) using non-food fundraising activities and student reward programs. A key lesson learned from these success

stories is that students will buy healthful foods and beverages—and schools can make money from selling healthful options. Private industry also has initiated plans to regulate sugar-sweetened beverages in schools. The Alliance for a Healthier Generation, a joint initiative of the William J. Clinton Foundation and the American Heart Association, partnered with the American Beverage Association to create guidelines that will limit portion sizes and the number of calories that beverage manufacturers will offer to students in schools (Alliance for a Healthier Generation, 2006). Future guidance on this strategy will be available in October 2006, when the Institute of Medicine releases recommended nutrition standards for foods in schools.

Implementing Change

Most schools and districts face similar challenges to improving policies and programs for physical activity and nutrition, most notably 1) intense pressures to raise standardized test scores and the conventional wisdom that this can best be achieved by a narrowing of the school's focus and curriculum, and 2) limited budgets that make program improvements difficult and tempt schools to sell high-fat or high-sugar foods and beverages to raise money. Often, it takes the leadership of a local champion to initiate change. The identity of this champion varies from community to community: it might be a superintendent, school board member, school administrator, parent, student, teacher, health professional, or food service director. Local champions interest others in physical activity and nutrition issues and then establish a broad-based team to conduct needs assessments, and to plan, implement, and evaluate improvements to school policies and programs.

Conclusion

The childhood obesity epidemic is one of the major public health, social, and economic challenges of the 21st century. Without a strong contribution from schools, we are not likely to reverse the epidemic. Improving and intensifying efforts to promote physical activity and healthy eating is entirely consistent with the fundamental mission of schools: educating young people to become healthy, productive citizens who can make meaningful contributions to society. Fortunately, we have learned a great deal in recent years about what schools can do to effectively promote physical activity and healthy eating, and we have a wealth of new resources available to help schools get it done. Through state and community leadership, schools can overcome obstacles, implement strategies, and play a strong role in addressing the childhood obesity epidemic.

The findings and conclusions in this paper are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

The essential cause of the increase in overweight among children and adolescents is caloric imbalance, which results from inadequate physical activity, poor dietary choices, or both. These behaviors are influenced by many sectors of society, including families, community organizations, health care providers, faith-based institutions, government agencies, the media, and schools. None of these sectors can solve the childhood obesity epidemic on its own; however it is unlikely to be solved without strong school-based policies and programs.

Sarah M. Lee

Howell Wechsler

Allison Balling

Please Post

President's Council on Physical Fitness & Sports
200 Independence Avenue, S.W., Washington, DC 20201
(202) 690-9000 • FAX (202) 690-5211

References

- Aldana, S.G. (2001). Financial impact of health promotion programs: A comprehensive review of the literature. *American Journal of Health Promotion, 15*(5), 296-320.
- Allegante, J.P. (1998). School-site health promotion for staff. In E. Marx & S. Frelick Wooley (Eds.), *Health is Academic* (pp. 224-243). New York, NY: Teachers College Press.
- Alliance for a Healthier Generation. (2006). *Press release: Alliance for a Healthier Generation and industry leaders set healthy school beverage guidelines for U.S. schools*. Retrieved on May 23, 2006 from <http://www.healthiergeneration.org/beverage.html>.
- American Cancer Society. (1999). *Improving school health: A guide to school health councils*. Atlanta, GA: American Cancer Society.
- Austin, S.B., Fung, T., Cohen-Bearak, A., Wardle, K., & Cheung, L.W.Y. (2006). Facilitating change in school health: a qualitative study of schools' experiences using the School Health Index. *Preventing Chronic Disease, 3*(2), A35. Available from: URL: http://www.cdc.gov/pcd/issues/2006/apr/05_0116.htm.
- Burgeson, C.R., Wechsler, H., Brener, N.D., Young, J.C., & Spain, C.C. (2001). Physical education and activity: Results from the School Health Policies and Programs Study 2000. *Journal of School Health, 71*(7), 279-293.
- Burke, V., Beilin, L.J., Simmer, K., Oddy, W.H., Blake, K.V., Doherty, D., Kendall, G.E., Newnham, J.P., Landau, L.I., & Stanley, F.J. (2005). Predictors of body mass index and associations with cardiovascular risk factors in Australian children: a prospective cohort study. *International Journal of Obesity, 29*, 15-23.
- California Department of Health Services & Public Health Institute. (n.d.). *California Project Lean*. Retrieved on May 23, 2006 from <http://www.californiaprojectlean.org/>.
- Centers for Disease Control and Prevention. (n.d.). *Coordinated School Health Program*. Retrieved May 23, 2006 from <http://www.cdc.gov/healthyyouth/CSHP>.
- Centers for Disease Control and Prevention. (1996). Guidelines for school health programs to promote lifelong healthy eating. *Morbidity and Mortality Weekly Reports, 45*(RR-9), 1-41.
- Centers for Disease Control and Prevention. (1997). Guidelines for school and community programs to promote lifelong physical activity among young people. *Morbidity and Mortality Weekly Report, 46*(RR-6), 1-36.
- Centers for Disease Control and Prevention. (2003). Stories from the field: Lessons learned about building coordinated school health programs. Washington, DC: U.S. Department of Health and Human Services.
- Centers for Disease Control and Prevention. (2005). *School health index: A self-assessment and planning guide*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
- Chan, C.B., Ryan, D.A., & Tudor-Locke, C. Health benefits of a pedometer-based physical activity intervention in sedentary workers. *Preventive Medicine, 39*(6), 1215-1222.
- Child Nutrition and WIC Reauthorization Act of 2004, 42 U.S.C. 1751. (The Office of Law Revision Council of the U.S. House of Representatives, 2004).
- Contento, I., Balch, G., Bronner, Y., Lytle, L., Maloney, S., Olson, C., Swadener, S., & Randall, J. (1995). Nutrition education for school-aged children. *Journal of Nutrition Education, 27*(6), 298-311.
- Cooper, A.R. (2005). Physical activity levels of children who walk, cycle, or are driven to school. *American Journal of Preventive Medicine, 29*(3), 179-184.
- Cullen, K.W., Eagan, J., Baranowski, T., Owens, E., & De Moor, C. (2000). Effect of a 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), 1482-1486.
- Eisenberg, M.E., Neumark-Sztainer, D., & Story, M. (2003). Associations of weight-based teasing and emotional well-being among adolescents. *Archives of Pediatrics and Adolescent Medicine, 157*, 733-738.
- Fagot-Campagna, A. (2000). Emergence of type 2 Diabetes in children: The epidemiological evidence. *Journal of Pediatric Endocrinology and Metabolism, 13*, supplement 6, 1395-1402.
- Food and Nutrition Service, U.S. Department of Agriculture; Centers for Disease Control and Prevention, U.S. Department of Health and Human Services; & U.S. Department of Education. (2005). *Making It Happen: School Nutrition Success Stories* (FNS Publication No. FNS-374). Alexandria, VA: U.S. Department of Agriculture.
- Fox, M.K., Crepinsek, M.K., Connor, P., & Battaglia, M. (2001). *School nutrition dietary assessment study II: Summary of findings*. Report No. CN-01-SNDAIL. Alexandria, VA: U.S. Department of Agriculture.
- Freedman, D.S., Dietz, W.H., Srinivasan, S.R., & Berenson, G.S. (1999). The relation of overweight to cardiovascular risk factors among children and adolescents: The Bogalusa Heart Study. *Pediatrics, 103*(6), 1175-1182.
- Galemore, C. (2000). Worksite wellness in the school setting. *Journal of School Nursing, 16*(2), 25-28.
- Gortmaker, S., Peterson, K., Wiecha, J., Sobol, A.M., Dixit, S., Fox, M.K., & Laird, N. (1999). Reducing obesity via a school-based interdisciplinary intervention among youth: Planet Health. *Archives of Pediatric and Adolescent Medicine, 153*, 409-418.
- Grunbaum, J.A., Rutman, S.J., & Sathrum, P.R. (2001). Faculty and staff health promotion: Results from the School Health Policies and Program Study, 2000. *Journal of School Health, 71*(7), 335-9.
- Hedley, A.A., Ogden, C.L., Johnson, C.L., Carroll, M.D., Curtin, L.R., & Flegal, K.M. (2004). Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *Journal of the American Medical Association, 291*(23), 2847-2850.
- Hyde, W.H. & Guthrie, S.H. (1993). Creating a healthier work environment. *School Business Affairs, 40-44*.
- Institute of Medicine of the National Academies. (2005). *Preventing childhood obesity: Health in the balance* (J.P. Koplan, C.T. Liverman, & V.I. Kraak, Eds.). Washington, DC: The National Academies Press.
- Kann, L., Brener, N.D., & Allensworth, D.D. (2001). Health education: Results from the School Health Policies and Programs Study 2000. *Journal of School Health, 71*(7), 266-278.
- Kann, L., Grunbaum, J.A., McKenna, M.L., & Wechsler, H. (2005). Competitive foods and beverages available for purchase in secondary schools: Selected sites, United States 2004. *Morbidity and Mortality Weekly, 54*(37), 917-921.
- Kubik, M.Y., Lytle, L.A., & Story, M. (2005). Schoolwide food practices are associated with body mass index in middle school students. *Archives of Pediatrics and Adolescent Medicine, 159*, 1111-1114.
- Luepker, R.V., Perry, C.L., McKinlay, S.M., Philip, N., Parcel, G., Stone, E.J., Webber, L.S., Elder, J.P., Feldman, H.A., Johnson, C.C., Kelder, S.H., & Wu, M. (1996). Outcomes of a field trial to improve children's dietary patterns and physical activity: The Child and Adolescent Trial for Cardiovascular disease (CATCH). *Journal of the American Medical Association, 275*(10), 768-776.
- Marchione, M. (2005, July 3). Too fat to fight? Obesity takes a heavy toll on the military. *Associated Press*, p. 1. Retrieved May 19, 2006 from www.ap.org.
- Michigan Department of Education. (n.d.). *Brain Breaks*. Retrieved on May 23, 2006 from <http://www.emc.cmich.edu/BrainBreaks/>.
- Michigan Department of Education. (2005). Education, community health departments lead Michigan schools in healthier direction. Retrieved on June 12, 2006 from <http://www.michigan.gov/mde>.
- Narayan, V.K.M., Boyle, J.P., Thompson, T.J., Sorensen, S.W., & Williamson, D.F. (2003). Lifetime risk for diabetes mellitus in the United States. *Journal of the American Medical Association, 290*(14), 1884-1890.
- National Association for Sport and Physical Education. (n.d.). *What constitutes a quality physical education program*. Retrieved on May 23, 2006 from <http://www.aahperd.org/NASPE/template.cfm?template=qualityPePrograms.html>.
- National Association for Sport and Physical Education. (2004). *Moving into the future: National standards for physical education (2nd ed.)*. Reston, VA: National Association for Sport and Physical Education.
- National Association for Sport and Physical Education. (2005). Understanding the difference: Is it physical education or physical activity? Retrieved June 12, 2006, from <http://www.aahperd.org/naspe>.
- National Association of State Boards of Education. (n.d.). State-level school health policies: State-by-state coordinating advisory councils. Retrieved May 23, 2006 from <http://www.nasbe.org/HealthySchools/States/Topics.asp?Category=F&Topic=1>.
- National Association of State Boards of Education. (2000). *Fit, healthy, and ready to learn: Part 1: Physical Activity, Healthy Eating, and Tobacco-Use Prevention*. Alexandria, VA: National Association of State Boards of Education.
- National Center for Education Statistics. (2005). *Digest of education statistics, 2004*. Retrieved May 23, 2006, from <http://nces.ed.gov/programs/digest/d04/>.
- Ogden, C.L., Flegal, K.M., Carroll, M.D., & Johnson, C.L. (2002). Prevalence and trends in overweight among US children and adolescents, 1999-2000. *Journal of the American Medical Association, 288*(14), 1728-1732.
- Ogden, C.L., Carroll, M.D., Curtin, L.R., McDowell, M.A., Tabak, C.J., & Flegal, K.M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. *Journal of the American Medical Association, 295*, 1549-1555.
- Partnership for Prevention. (2001). *Healthy workforce 2010: An essential health promotion sourcebook for employers, large and small*. Washington, DC: Partnership for Prevention.
- Pate, R.R., Ward, D.S., Saunders, R.P., Felton, G., Dishman, R.K., & Dowda, M. (2005). Promotion of physical activity among high-school girls: A randomized controlled trial. *American Journal of Public Health, 95*(9), 1582-1587.
- Position of the American Dietetic Association, Society for Nutrition Education, and American School Food Service Association. (2003). Nutrition services: An essential component of comprehensive school health programs. *Journal of the American Dietetic Association, 103*(4), 505-514.
- Ribeiro, J., Guerra, S., Pinto, A., Oliveira, J., Duarte, J., & Mota, J. (2003). Overweight and obesity in children and adolescents; relationship with blood pressure and physical activity. *Annals of Human Biology, 30*(2), 203-213.
- Ridgers, N.D., Stratton, G., & Fairclough, S.J. (2005). Assessing physical activity during recess using accelerometry. *Preventive Medicine, 41*(1), 102-7.
- Robinson, T.N. (1999). Reducing children's television viewing to prevent obesity: A randomized controlled trial. *Journal of the American Medical Association, 282*(16), 1561-1567.
- Sallis, J.F., McKenzie, T.L., Alcaraz, J.E., Kolody, B., Faucette, N., & Hovell, M.F. (1997). The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students. *American Journal of Public Health, 87*(8), 1328-1334.
- Sallis, J.F., McKenzie, T.L., Kolody, B., Lewis, M., Marshall, S., & Rosengard, P. (1999). Effects of health-related physical education on academic achievement: Project SPARK. *Research Quarterly for Exercise & Sport, 70*(2), 127-134.
- School District of Pittsburgh. (2005). Pittsburgh Public Schools' wellness policy. Retrieved on May 23, 2006 from <http://www.pps.k12.pa.us/stuff/adopted%20wellness%20policy.pdf>.
- Schwimmer, J.B., Burwinkle, T.M., & Varni, J.W. (2003). Health-related quality of life of severely obese children and adolescents. *Journal of the American Medical Association, 289*, 1813-1819.
- Shire, K. (2003). *Promoting healthy youth, schools, and communities: A guide to community-school health councils*. Atlanta, GA: American Cancer Society.
- Staten, L.K., Teufel-Shone, N.I., Steinfelt, V.E., Ortega, N., Halverson, K., Flores, C., & Lebowitz, M.D. (2005). The school health index as an impetus for change. *Preventing Chronic Disease, 2*(1), A19.
- Staunton, C.E., Hubschmidt, D., & Kallins, W. (2003). Promoting safe walking and biking to school: The Marin County success story. *American Journal of Public Health, 93*(9), 1431-1434.
- Strauss, R.S., & Pollack, H.A. (2003). Social marginalization of overweight children. *Archives of Pediatric and Adolescent Medicine, 157*, 746-752.
- Stewart, J.A., Dennison, D.A., Kohl, H.W., & Doyle, A. (2004). Exercise level and energy expenditure in the Take 10! in-class physical activity program. *Journal of School Health, 74*(10), 397-400.
- Strong, W.B., Malina, R.M., Blimkie, C.J.R., Daniels, S.R., Dishman, R.K., Gutin, B., et al. (2005). Evidence based physical activity for school-age youth. *Journal of Pediatrics, 146*, 732-737.
- Task Force on Community Preventive Services. (2002). Recommendations to increase physical activity in communities. *American Journal of Preventive Medicine, 22*(4/5), 67-72.
- The Joint Committee on National Health Education Standards. (1995). *National Health Education Standards: Achieving Health Literacy*. Atlanta, GA: American Cancer Society.
- Tudor-Locke, C., Neff, N.J., Ainsworth, B.E., Addy, C.L., & Popkin, B.M. (2002). Omission of active commuting to school and the prevalence of children's health-related physical activity levels: the Russian Longitudinal Monitoring Study. *Child: Care, Health, & Development, 28*(6), 507-512.
- U.S. Department of Agriculture. (1994). *National school lunch program and school breakfast program nutrition objectives for school meals (from 7 CFR parts 210, 220 59)*. Retrieved May 23, 2006, from www.fns.usda.gov/cnd/Governance/regulations.htm.
- U.S. Department of Agriculture. (2001). *Foods sold in competition with USDA school meal programs: A Report to Congress*. Washington, DC: U.S. Department of Agriculture.
- U.S. Department of Agriculture. (2006). *National Level Annual Summary Tables, 1969-2005*. Retrieved on May 23, 2006 from <http://www.fns.usda.gov/pd/sllsummar.htm>.
- 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 and U.S. Department of Agriculture. (2005). *Dietary Guidelines for Americans, 2005* (6th ed.). Washington, DC: U.S. Government Printing Office.
- U.S. Department of Health and Human Services. (2000). *Healthy people 2010: health goals for the nation*. Washington, DC: U.S. Department of Health and Human Services.
- Valois, R.F. & Hoyle, T.B. (1999). Formative evaluation results from the Mariner Project: a coordinated school health pilot program. *Journal of School Health, 70*(3), 95-103.
- Wechsler, H., Brener, N.D., Kuester, S., & Miller, C. (2001). Food service and foods and beverages available at school: Results from the School Health Policies and Programs Study 2000. *Journal of School Health, 71*(7), 313-324.
- White, J.L. & Ransdell, L.B. (2003). Worksite intervention model for facilitating changes in physical activity, fitness, and psychological parameters. *Perceptual and Motor Skills, 97*(2), 461-466.
- Williams, D.E., Caldwell, B.L., Cheng, Y.J., Cowie, C.C., Gregg, E.W., Geiss, L.S., Engelgau, M.M., Narayan, V., & Imperatore, G. (2005). Prevalence of impaired fasting glucose and its relationship with cardiovascular disease risk factors in US adolescents, 1999-2000. *Pediatrics, 116*, 1122-1126.