

# Physical Activity, Public Health, and Elementary Schools

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## Abstract

Physical inactivity is a serious public health problem that is associated with numerous preventable diseases. Public health concerns, particularly those related to the increased prevalence of overweight, obesity, and diabetes, call for schools to become proactive in the promotion of healthy, physically active lifestyles. This article begins by differentiating physical activity from associated concepts (e.g., physical education, physical fitness) and then summarizes the literature related to the importance of physical activity for children and the need for its promotion in elementary schools. We describe numerous opportunities for children to accrue physical activity in elementary schools (e.g., physical education classes, program integration with other subject areas, recess, extracurricular programs, and active transport to school) and provide recommendations for sound educational practice.

Physical activity is the process of engaging in bodily movement that results in energy expenditure, and it is essential for good health. Distinguishing between physical activity and two similar-sounding and related concepts, physical fitness and physical education, is important. Physical fitness is an outcome that has both performance-related and health-related components. The performance-related components of fitness, such as balance, coordination, speed, and reaction time, are closely related to athletic performances. In contrast, the health-related fitness components are primarily connected to biological outcomes, and these are associated with lower risk for cardiovascular and metabolic diseases (e.g., diabetes) and lower-back pain. The health-related components, cardiorespiratory (heart-lung) fitness, muscular strength and endurance, flexibility,

and body composition, are the fitness factors commonly tested in schools.

Physical education, a standardized part of the school curriculum, is one of the eight components of a coordinated/comprehensive school health program and is mandated in nearly all states. Unlike recess, which involves free play, physical education has defined educational objectives. These include promoting a physically active lifestyle, developing physical fitness, focusing on knowledge acquisition (e.g., how the human body moves and the history, tactics, and scientific principles of games, sports, and dance), and developing social, emotional, and physical skills.

Physical activity, physical fitness, and health are interrelated, but the precise connection remains unclear. Children's habitual physical activity is significantly related to most fitness components, and increases in both physical activity and physical fitness are associated with improved measures of health (Strong et al., 2005). The effects of physical activity on health appear to have multiple mechanisms, and not all of these depend on fitness. Meanwhile, all three are influenced by other factors, including heredity, environment, and lifestyle behaviors.

The beneficial effects of physical activity on many bodily systems in adults have been known for some time (U.S. Department of Health and Human Services [USDHHS], 1996), and its immediate and long-term effects on children are now becoming more clear (Strong et al., 2005). For example, reviews of the scientific literature show that physical activity reduces the risk of overweight and Type 2 diabetes in children and aids in their treatment.

The proportion of children who are overweight has more than tripled since the 1970s. Not only does being overweight in childhood have its own physical and psychological health problems, overweight children also are likely to become overweight or obese in adulthood when they will be at increased risk for cardiovascular

disease, diabetes, and cancer (Strong et al., 2005). As well, activities that work against gravity help increase the strength and density of bones, which may prevent osteoporosis later in life. Improvement in flexibility, muscular strength, and bone health not only aids children's movement and sports performances but is also thought to be related to reduced occurrences of back pain and fractures in adulthood (Malina, Bouchard, & Bar-Or, 2004). Vigorous physical activity may also help improve psychological health and mood, and among high-risk youths, can reduce blood pressure and increase HDL cholesterol (Strong et al., 2005).

In general, decreasing risk factors in youths is important because risk factors for many diseases in childhood predict risk factors for disease in adulthood, including obesity, Type 2 diabetes, and cardiovascular disease. Risk associations are similar for children and adults, so it is likely that risk for many future diseases can be reduced not only by children engaging regularly in physical activity but also by their developing the skills and habits that will permit them to have an active lifestyle as they grow older.

National standards for physical fitness have been available for over 80 years, and its measurement has long been a tradition in schools, but tools for objectively assessing physical activity (e.g., accelerometers) have been developed only recently. Additionally, the first national recommendations for physical activity and health promotion and disease prevention in children have recently been released (Strong et al., 2005). After thoroughly reviewing the body of expanding evidence-based research, diverse health experts agreed that school-age children should participate daily in 60 minutes or more of moderate to vigorous physical activity that is developmentally appropriate, enjoyable, and involves a variety of activities. This 60-minute goal is also reflected in the 2005 *Dietary Guidelines for Americans* (USDHHS/USDA, 2005). The recommended physical activity minutes can be obtained

in a variety of settings and accumulated through the day, but they should accommodate individual children's age and development. Some children, such as those with risk for overweight or diabetes, may need more than 60 minutes per day in order to maintain or regain adequate health status.

### Schools and Public Health

Public health objectives are designed to reduce preventable death, disease, and disability among the population, and schools have been identified as a key setting for promoting public health (Allensworth, Lawson, Nicholson, & Wyche, 1997; Pate et al., 2006). Schools, however, are primarily and deliberately designed to produce cognitive outcomes, and their structures and programs inadvertently suppress children's physical activity. Meanwhile, the sedentary lifestyles that Americans have adopted have become such a national concern that the Surgeon General, the leading health professional in the United States, issued a report affirming the need of public and private sectors (including schools) to commit to promoting physical activity among the citizenry (USDHHS, 1996). This unprecedented volume is based mainly on adult data, but it has been followed by a series of reports that focus on children.

These subsequent reports call on schools to take a proactive role in promoting physical activity to combat sedentary-related problems, especially the obesity and Type 2 diabetes epidemics. For example, *Guidelines for School and Community Programs to Promote Lifelong Physical Activity among Young People* (Centers for Disease Control and Prevention [CDC], 1997) provides 10 categories of recommendations for school and community programs to promote physical activity. These include recommendations for policy, environment, physical education classes, health education curricula, extra-curricular activities, parental involvement, personnel training, health services, community programs, and evaluation. *Promot-*

*ing Physical Activity: A Guide to Community Action* devotes a chapter to social marketing and behavioral science that specifically targets schools (CDC, 1999).

*Healthy People 2010* (USDHHS, 2000) (HP 2010), which identifies the most significant preventable threats to health and establishes national goals to reduce these threats, establishes specific public health objectives for youth physical activity on school campuses, both within and outside of physical education classes. In brief, HP 2010 promotes youth physical activity of a moderate (Objective 22-6) and vigorous (Objective 22-7) intensity, daily school physical education (Objectives 22-8 and 22-9), and physical education classes that are highly active (Objective 22-10). HP 2010 also includes objectives related to providing access to school physical activity facilities beyond the school day (Objective 22-12) and having students walk (Objective 22-14) and bicycle to school (Objective 22-15).

The *School Health Index, Elementary Version* (CDC, 2004) provides tools to help elementary schools identify the strengths and weaknesses of physical activity and physical education policies and programs as well as to develop action plans for improving them. Finally, all of the federal reports noted above have been supported by initiatives and documents from outside government (Koplan, Liverman, & Kraak, 2005), including a recent scientific statement from the American Heart Association (AHA) (Pate et al., 2006).

### Physical Activity Opportunities at Elementary Schools

Because they exist in all communities, are attended by nearly all children, provide safe environments, and often have facilities, equipment, and trained personnel, schools have been identified as the institution with the primary responsibility for promoting physical activity (Sallis & McKenzie, 1991). In addition to providing mandated curricular programs (i.e., physical education), el-

elementary schools can offer children opportunities for physical activity through intramural sports and competitions (e.g., school "olympics"), organized dance and noncompetitive activity clubs, and structured and nonstructured leisure-time activities before and after school and at recess. A few elementary schools also provide opportunities for children to engage in physical activity during interscholastic competitions or play days with other schools.

Data on physical activity in schools across the United States are sparse. The School Health Policies and Programs Study (SHPPS) is a national survey conducted periodically to assess school health policies and programs (Burgeson, Wechsler, Brener, Young, & Spain, 2001). For the year 2000, SHPPS reported that only 8% of elementary schools provided daily physical education or its equivalent (150 minutes per week) for the entire school year, and 71.4% of them provided regularly scheduled recess for students in grades kindergarten through 5. The survey was repeated in 2006. Studies of interventions to improve physical activity that use strong research designs in which schools are assigned randomly to treatment conditions are almost exclusively limited to physical education settings (Stone, McKenzie, Welk, & Booth, 1998).

#### Health-Related Physical Education (HRPE)

Physical education, mandated as a curriculum area in nearly all 50 states (National Association for Sport and Physical Education [NASPE], 2006), is considered to be an important component of a coordinated school health program (Allensworth et al., 1997) and is one of only five interventions strongly recommended for increasing physical activity by the national Task Force on Community Preventive Services (Kahn et al., 2002). Datar and Sturm (2004) estimate that increasing physical education instruction in kindergarten and first grade by as little as 1 hour per week

could reduce the number of overweight 5- and 6-year-old girls nationally by as much as 10%.

Meanwhile, providing physical activity opportunities for children is only one of the many goals of physical education, which also has expectations for motor skill, cognitive, social, and emotional outcomes (NASPE, 2006). Because students cannot accomplish all proposed outcomes in the limited time allocated for classes, a number of professionals have promoted "health-related physical education" (Sallis & McKenzie, 1991). The main goal of HRPE is the development of lifelong physical activity, which is closely associated with public health objectives and a redirection from fitness and sport training toward "turning students on" to physical activity during and beyond classes. This suggests that physical education should be an enjoyable experience during which elementary school students can learn basic, generalizable movement skills that can be integrated into multiple activities, sports, and games they engage in at school, in the community, and later in life.

Direct measures during standard physical education using validated systems typically show that children rarely have programs that reach national recommendations for frequency (i.e., daily), duration, and intensity. For example, third-grade children in 684 elementary schools in 10 states averaged 2.1 lessons per week (mean length 33 minutes). Less than 6% of the children had physical education daily, and during individual lessons they accrued only 4.8 vigorous and 11.9 moderate to vigorous physical activity (MVPA) minutes, 15% and 37% of class time, respectively (National Institute of Child Health and Human Development Study of Early Child Care and Youth Development Network, 2003). As is typical in physical education and at recess, boys spent proportionately more time in vigorous and moderate physical activity than girls.

Another study conducted in 96 schools in four regions of the United States showed that third graders engaged in MVPA only

36% of class time (McKenzie et al., 1995). There were substantial regional differences in the frequency and length of lessons and in the amount of physical activity children accrued during them, but overall physical education classes provided the children with only 6% of the weekly total of MVPA recommended for health.

Although public health entities promote daily physical education, the guidelines for the frequency and content of physical education differ by state, and its implementation varies by school district and individual school and/or teacher. The current "back to the (academic) basics" movement has negatively influenced financial and other support for physical education and physical activity programs. Schools do not employ enough physical education specialists to enable all students to receive physical education daily or even three times per week (Burgeson et al., 2001; NASPE, 2006). Physical education in some elementary schools, if provided at all, may be conducted by classroom teachers who have little instruction in the subject matter and may not want to teach it. This is unfortunate because physical education classes taught by specialists typically produce more favorable physical activity, fitness, and skill outcomes than those delivered by classroom teachers (Sallis et al., 1997).

Randomized research trials have shown, however, that activity levels during physical education, as well as physical fitness and skill development, can be improved through the adoption of a health-related curriculum, staff development, and on-site consultations (McKenzie et al., 1996, 2001; Sallis et al., 1997). Both physical education specialists and classroom teachers have produced substantial gains, sometimes without increasing the frequency or length of classes. Results of these programs can be long lasting in schools, and they are associated with the availability of equipment and support for physical education by the school principal and classroom teachers

(Dowda, Sallis, McKenzie, Rosengard, & Kohl, 2005; McKenzie et al., 2003).

Even when provided daily, physical education by itself cannot provide the recommended 60 minutes per day of active engagement. Thus, improving mandated physical education should be considered only one of many strategies to achieve the benefits of physical activity in schools. Educators, therefore, should consider redesigning the total school environment so students have opportunities to be more active.

#### Integrating Physical Education with Other Curricular Areas

Attempts have been made to create and teach lessons that are integrated or interdisciplinary in nature, where movement and manipulative activities are infused with other subject areas such as science and math. This is challenging because neither physical educators nor classroom-based teachers are typically trained in content and pedagogical knowledge to teach outside their specific areas. Web resources, practical books (e.g., Cone, Werner, Cone, & Woods, 1998), and a few programs such as TAKE 10! (Stewart, Dennison, Kohl, & Doyle, 2004) are available, but there are few objective data on either the prevalence of integrated physical education or its efficacy in promoting physical activity. In contrast, results of the PLAY (Promoting Lifestyle Activity for Youth) program showed that directly targeting physical activity by having structured breaks during the school day significantly increased the amount of physical activity children received at school (Pangrazi, Beighle, Vehige, & Vac, 2003).

#### Recess: The Fourth "R"

Recess not only provides children with opportunities for physical activity but has additional educational and developmental benefits (Pellegrini & Bohn, 2005; Sindelar, 2004). These include (a) social (e.g., sharing, cooperation, communication, problem solving, conflict resolution, and self-discipline), (b) emotional (e.g., stress relief, self-esteem,

character development), and (c) cognitive (e.g., creativity, problem solving, and vocabulary) development. Recent position statements promote recess periods totaling at least 20 (NASPE, 2006) or 30 minutes per day (Pate et al., 2006); however, only 71.4% of elementary schools provide regularly scheduled recess for students in all grades (Burgeson et al., 2001).

Research on physical activity accrual during recess has been limited, perhaps because of lack of standardization of the number, duration, location, and purposes of recess periods. Additional research is needed, but studies conducted in the United States and abroad identify some tentative findings (Beighle, Morgan, Le Masurier, & Pangrazi, 2006; McKenzie et al., 1997; Pellegrini & Bohn, 2005; Ridgers, Stratton, Fairclough, & Twisk, 2007; Sarkin, McKenzie, & Sallis, 1997). At all grade levels, boys are typically more active than girls during recess, and the differences may be related to opportunity, expectations from peers and teachers, and how the children themselves view recess (e.g., to play actively or to socialize). Increased physical activity is related to activity prompts from peers and teachers, presence of equipment, size of play spaces, playgrounds having clear and colorful markings, direct attempts to program and structure activity, and recess being held outdoors.

Studies sometimes show children are more physically active (e.g., percentage time in MVPA) at recess than during physical education (Sarkin et al., 1997), but recommendations from these findings should be made cautiously. The two settings differ in structure (e.g., structured vs. nonstructured) and have very different objectives. Children need physical activity in both environments if they are to accrue the recommended 60 minutes daily for health purposes. Recess should neither be discontinued in schools nor be used as a replacement for physical education. As well, students who are "problems" in the classroom are often those most in need of physical activity, so access to recess ought not to be contin-

gent on children's classroom behavior or academic standing.

#### Extracurricular Programming

Intramural and interscholastic sports run by schools are common at middle and high schools (Burgeson et al., 2001), but there are few sources of data on the prevalence of these extracurricular programs in elementary schools. It is logical that children's MVPA at school would be increased when opportunities become available to participate on sports teams and in noncompetitive programs (e.g., dance, outdoor events). A few intervention studies have been completed (e.g., Kelder et al., 2005), including those for low-active and overweight children (e.g., Yin et al., 2005). Evidence suggests that physical activity objectives are achieved when developmentally appropriate and appealing activities are delivered by well-trained staff who are vested in the program (possibly through incentives), administrative support and modeling are available, sufficient equipment is available and easily stored, and external barriers are surmounted (e.g., transportation).

#### Facility Utilization

Facilities and equipment available are often an underutilized resource, and another noncurricular approach for increasing MVPA at schools is to make physical activity facilities accessible to nonschool entities (CDC, 1997). Data on this strategy are limited, but O'Hara Tompkins, Zizzi, Zedosky, Wright, and Vitullo (2004) found that 35.2% and 87.4% of elementary schools in West Virginia provided access to indoor facilities and outdoor facilities, respectively, outside of normal school hours. Long-range planning among various community entities is needed, particularly related to design, shared use, and budgeting. To avoid or reduce supervision and liability issues, shared-use policies with local municipality and government agencies need to be arranged.

### Activity Programs Involving Family Members

Family members influence each other in many different ways. Schools might involve families in physical activity by requiring children to do homework related to physical activity or physical fitness, offering special events and evening programs, sending home newsletters, and prompting parents to encourage and reward their children's physical activity. These strategies have been described in a variety of publications, but data on their effectiveness are limited (Marcoux et al., 1999). Families are more likely to participate in programs when children are young, and the many impediments to family-oriented programs need to be considered and overcome (Nader et al., 1996). Among them are money, time, staff training, and the design of programs so that parents perceive them as important.

### Active Transport to and from School

Walking and biking to school provide ways for children to accumulate recommended minutes of MVPA, and active transport to and from school is promoted in *Healthy People 2010*. Parents, however, frequently cite distance, perceptions of traffic danger, and weather conditions as barriers, and increased numbers of children are being taken to school via motorized vehicles (CDC, 2006). To help overcome some of these barriers, the CDC developed "Kids Walk-to-School," a community-based program that aims to increase opportunities for daily physical activity by encouraging children to walk to and from school in groups accompanied by adults. The program also advocates for the establishment of partnerships in which the school, PTA, local police department, department of public works, civic associations, local politicians, and businesses work together to create an environment that is supportive of walking and bicycling to school safely. Research on the effectiveness of these programs and their generalizability is currently limited.

### Conclusion and Recommendations for Practice

The need for schools to provide and promote youth physical activity is now far greater than during previous centuries when children accrued substantial amounts of physical activity in daily living. Children do not engage in compensatory physical activity at home or in the community after experiencing a sedentary school day (Dale, Corbin, & Dale, 2000), and objective data supporting the elimination of physical education and recess time to achieve increases in achievement on "core" subjects do not exist. Indeed, children's physical fitness scores are related to academic achievement, and although the mechanism is unclear, increased physical activity may enhance classroom performances. Van der Mars (2006) recently reviewed studies of the relation between physical education and academic achievement and concluded that (a) increased time in physical education does not impede students' classroom academic performance, (b) increased time in physical education may contribute slightly to better academic performance, and (c) decreased time for physical education in favor of academic work does not necessarily result in improved academic performance.

Some youths, including those from ethnic minorities (especially girls), children living in poverty, children with disabilities, and those living in public housing and neighborhoods where physical activity is restricted by safety concerns and lack of facilities, are at increased risk of having low levels of physical activity (USDHHS, 2001). Unlike most other venues, physical activity programs at elementary schools are available to children regardless of their socioeconomic status.

The U.S. Congress has recognized that schools play a critical role in promoting student health, preventing childhood obesity, and combating problems associated with poor nutrition and physical inactivity. To formalize and encourage this role, Congress passed a law (P.L. 108-265) requiring local

educational agencies receiving federal funds (i.e., most schools) to establish a local school wellness policy by 2006. This legislation places the responsibility of developing wellness policies at the local level, so that the needs of individual districts can be addressed. According to requirements for local wellness policies, school districts must set goals for physical activity, nutrition education, campus food provision, and other school-based activities designed to promote student wellness. Additionally, districts are required to involve a broad group of individuals in developing policies and have a plan for measuring their implementation.

Many agencies also recognize the need to assist schools in promoting physical activity and have developed materials and recommendations to support best practices. For example, the National Association of State Boards of Education's *Fit, Healthy, and Ready to Learn: A School Health Policy Guide* (2006) provides numerous sample policies designed to encourage physical activity and other healthy behaviors. Not all agencies base their recommendations on scientific data, but the AHA does, and it recently released the scientific document *Promoting Physical Activity in Children and Youth: A Leadership Role for Schools* (Pate et al., 2006). The document provides recommendations for school policies and practices for America's schools relative to providing youth with the physical activity they need for lifelong health. We strongly support the AHA-recommended policies and practices and end our article by providing the following eight that relate to elementary schools:

1. Schools should ensure that all children and youth participate in a minimum of 30 minutes of moderate to vigorous physical activity during the school day; this includes time spent being active in physical education classes. Additional physical activity should be provided through extracurricular and school-linked community programs.
2. Schools should deliver evidence-based health-related physical edu-

cation programs that meet national standards to students at all school levels. These programs should provide substantial moderate to vigorous physical activity (e.g., 50% of class time) and should teach students the motor and behavioral skills needed to engage in lifelong physical activity.

3. States and school districts should ensure that physical education is taught by certified and highly qualified physical education teachers at all school levels.
4. States should hold schools accountable for delivering physical education programs that meet national standards for quality and quantity (i.e., 150 minutes/week for grades K-8). Specifically, each state should include physical education in its core educational accountability system and should incorporate into its system national standards for curriculum and instructional quality.
5. Schools should expand physical activity opportunities by providing clubs, lessons, intramural sports, and interscholastic sports programs that meet the physical activity needs and interests of all students. Coaches and other leaders of such programs should be well qualified and, where appropriate, certified.
6. Schools should promote walking and bicycling to school, and school leaders should work with local governments to ensure that students have safe routes for walking and bicycling to school.
7. Child development centers and elementary schools should provide children with at least 30 minutes of recess during each school day.
8. Colleges and universities should provide professional preparation programs that produce teachers who are highly qualified to deliver evidence-based physical education and health education programs.

#### Note

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