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Policies to Increase Youth Physical Activity in School and Community Settings

Introduction

Physical activity is important for children and adolescents. It increases physical fitness, lowers body fat, strengthens bones, reduces the risk of cardiovascular and metabolic disease, and decreases anxiety and depression.[1] However, most young people across the United States are not active enough. Only 42% of America's elementary school children and less than 8% of the nation's teens get the recommended levels of physical activity, based on the Department of Health and Human Services' 2008 *Physical Activity Guidelines for Americans.* The guidelines state that youth (ages 6–17) need at least 60 minutes of moderate to vigorous physical activity per day to receive health benefits.[2] Furthermore, America's youth are less active than those in other nations.[3]

Schools and communities can play major roles in providing opportunities for physical activity in children and teens. There is evidence that certain school-based policies increase physical activity levels among youth. Improvements to walking/biking paths and municipal parks may also help youth lead active, healthy lifestyles.

The Centers for Disease Control and Prevention (CDC) recently released *School Health Guidelines to Promote Healthy Eating and Physical Activity,* which includes recommendations for school-based policies aimed at increasing physical activity in schoolchildren (K–12).[4] It concludes that several approaches effectively increase physical activity among youth, including physical education classes, adopting standardized high quality physical education curricula designed to keep youth moving, providing daily recess with ample game equipment, integrating classroom physical activity breaks into the normal school day, modifying school playgrounds to promote active play, and providing afterschool programs.[5]

In addition, communities can be designed in ways that increase youth participation in physical activity. The following approaches are recommended: (a) community-scale urban design and land use policies, (b) creation of, or enhanced access to, places for physical activity, combined with information outreach, (c) street-scale urban design/land use policies, and (d) point-of-decision prompts to increase use of stairs.[6,7]

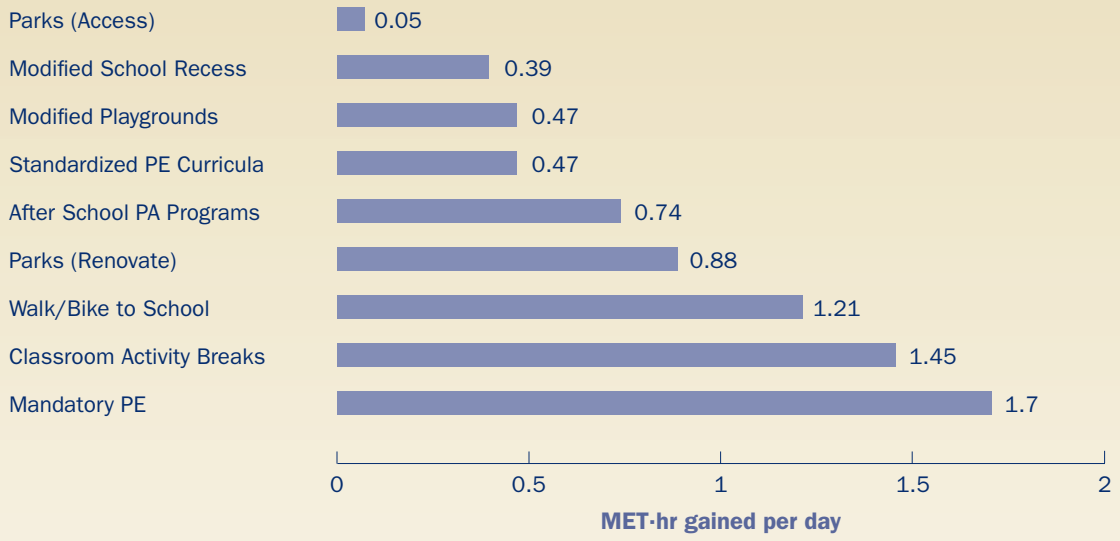
Policy approaches have certain advantages over individual approaches, including a broader population reach and increased chance of long-term sustainability.[8] However, policy makers are often limited by budget constraints that make it difficult to simultaneously implement multiple strategies for increasing activity. Thus, it is important to quantify the increase in physical activity with usage and impact metrics that result from different approaches. When armed with relevant, compelling research, school policy makers and community planners are able to make more informed decisions about which strategies to adopt that will lead to increased physical activity among children and teenagers.

A Review of Physical Activity Research in Children

In a previous review, we examined school policies and built-environment changes designed to increase physical activity in youth.[9] Over 300 original studies were identified. After screening the articles, a panel of six read 85 articles. Both longitudinal and cross-sectional studies were included. The panelists met to discuss study characteristics, rank the studies in terms of quality of research design, and estimate the caloric expenditure for each approach. In the final analysis, 65 articles met the inclusion criteria and could be translated into energy expenditure.

Energy expenditure was estimated based on physical activity outcomes reported in each article. Outcome variables were converted to a common unit (MET·hr gained per day), as described by Wu et al.[10] (One MET represents a metabolic equivalent and is expressed as 3.5 ml·kg^{-1}·min^{-1}.[11]) MET·hrs were determined by multiplying the energy expenditure of an activity by the duration of the activity. Since the MET·hr is not a unit that is familiar to everyone, we converted the energy expenditure to kilocalories for children of varying body weights (i.e., 50, 100, and 150 pounds). Since 1.0 MET is equal to 1.0 kilocalorie·kg^{-1}·hr^{-1}, then 1.0 kcal = 1.0 MET·hr x body weight (kg).

Figure 1. Impact of school-based policies and changes on physical activity energy expenditure in youth.



Bars show the mean of various studies within each category, weighted according to the total number of participants. PE = physical education; PA = physical activity. Source: Bassett DR, Fitzhugh EC, Heath GW, et al. Estimated energy expenditures for school-based policies and active living. *Am J Prev Med.* 2013;44(2):108–113

Table 1. Estimated kilocalorie expenditures among youth associated with school policies and built-environment changes.

	Kcal/day for 50-lb youth	Kcal/day for 100-lb youth	Kcal/day for 150-lb youth
Mandatory, Daily PE	39	77	116
Classroom Activity Breaks	33	66	99
Walk/Bike to School	27	55	82
Park Renovations	20	40	60
After School PA Programs	17	34	50
Standardized PE Curricula	11	21	32
Modified Playgrounds	10	21	31
Modified School Recess	9	18	27
Parks (Access)	2	4	5

PE = physical education; PA = physical activity.

The study characteristics, study quality, and amounts of physical activity gained as a result of various approaches were summarized in our prior review.[9] Since the studies with large sample sizes were believed to have greater ability to be translated into policy interventions that are broad in scope, each study was weighted in accordance with the sample size. This allowed us to rank order the approaches according to their impact on physical activity (Figure 1).

Table 1 shows the kilocalorie expenditures for each approach. The energy expenditure values (expressed as MET·hr gained per day) were converted to kilocalories expended per day, for youth of different body weights.

Approaches to Increasing Physical Activity in Youth—What Works?

The President's Council on Fitness, Sports & Nutrition (PCFSN) and the Office of Disease Prevention and Health Promotion of the Department of Health and Human Services recently released the *Physical Activity Guidelines for Americans (PAG) Midcourse Report: Strategies to Increase Physical Activity Among Youth*.[12] The report examined a number of strategies that are effective in getting youth active in various settings, including schools, childcare settings, homes, primary care facilities, and within the community. A subcommittee of experts conducted an extensive literature review over the course of a year that focused on evidence-based strategies across each setting. In general, the findings outlined here coincide with those of the PAG Midcourse Report subcommittee, and they help to quantify the magnitude of the changes in youth physical activity energy expenditure for these approaches. The approaches for increasing physical activity in youth will be described in the following sections.

1. Mandatory Physical Education

Children who are provided with physical education classes perform a substantial amount of physical activity. In 2006, 78.3% of schools in the United States required students to take some physical education (69.3% of elementary schools, 83.9% of middle schools, and 95.2% of high schools).[13] However, only 13.7% of elementary schools, 15.2% of middle schools, and 3.0% of high schools provided their students with physical education at least three days per week. In addition, only 3.8% of elementary schools, 7.9% of middle schools, and 2.1% of high schools provided daily physical education for the entire school year. With these percentages being so low, the impact of a mandatory daily (or at least three times per week) physical education policy could be very substantial.

Quality physical education classes not only result in higher levels of physical activity, they can also help establish a strong foundation for health and fitness knowledge among youth that can benefit them for a lifetime. Activities introduced in physical education classes help youth develop motor skills (jumping, running, and object manipulation) and social skills (teamwork and self-confidence).

There were no modifications to the curriculum or activities within these classes; thus, the studies examined in this section assessed physical activity in traditional physical education classes. The studies examined were primarily conducted within the United States; however, some were from England[14] and Sweden.[15] Three studies divided the physical activity accumulated during physical education classes by gender. Two of the studies found that boys are slightly more active than girls during physical education class,[15,16] but one study showed no difference between boys' and girls' activity levels.[17] While most of the studies focused on elementary school children, one intervention study focused on high school girls, and reported gains in physical activity with physical education classes.[18]

Many organizations have called for quality physical education in U.S. schools, including the CDC, American Heart Association (AHA), American Academy of Pediatrics (AAP), American College of Sports Medicine (ACSM), and the American Alliance for Health, Physical Education, Recreation, and Dance (AAPHERD).[19] In addition, the *PAG Midcourse Report* concluded that there is "sufficient" evidence that physical education results in more physical activity.[12] If daily physical education were mandated at a national level, substantial increases in energy expenditure of youth would result. This policy would have a broad scope, reaching 55 million youth enrolled in U.S. public schools (grades K–12).[20]

2. Standardized Physical Education Curricula

Physical education classes that are enhanced through the use of standardized curricula result in higher levels of physical activity, above and beyond those obtained in traditional physical education. However, in 2006 only 24.5% of schools provided their physical education teachers with a curriculum and only 55.4% of schools had a sequenced chart outlining skills and activities that need to be taught to students.[13] Standardizing the physical education curricula not only exposes more children to quality physical education, it could also lead to improvements in the quality of instruction. In a typical elementary, middle school, and high school physical education class, the total amount of time spent doing physical activity is about 35, 40, and 45 minutes, respectively.[13] The main focus of standardized curricula is to increase the proportion of active time during physical education. Teachers (either classroom teachers or physical education specialists) are provided with activities specially designed to promote activity and increase teachers' involvement and enthusiasm for the subject matter. In addition, these programs are designed to develop motor skills, promote healthy habits, and teach children how to positively engage with their peers.

Several studies focused on evaluating the effectiveness of standardized physical education curricula. In addition to the standardized activities, many of these studies required mandatory physical education at least three times per week. For example, Sports, Play, and Active Recreation for Kids (SPARK) was implemented within elementary schools in San Diego, California, and focused on promoting movement skill development and high levels of physical activity during three physical education classes each week.[21,22] Students received instruction in skill-related fitness, such as soccer and basketball, as well as health-related fitness, such as aerobics and walking. In addition, a study performed by McKenzie et al.[23] in 1993 (a follow-up was done in 1997[22]) revealed that the SPARK program, when delivered by a physical education specialist, was more effective in increasing the amount of activity children performed during physical education class than when the program was taught by classroom teachers. In another similar program, the Child and Adolescent Trial for Cardiovascular Health (CATCH), physical education staff were introduced to enhanced teaching methods that motivated staff to adopt an active lifestyle as well.[24]

A few studies[25–27] in this review focused on increased activity through team and individual sports. Teacher development and staff education also resulted in higher levels of physical activity during physical education classes. The *Middle School Physical Activity and Nutrition Study (M-SPAN)* physical education intervention focused on educating staff by providing them with materials and engaging them in healthy lifestyle activities, such as goal setting as a group and discussing health and activity-related ideas.[28]

Highlighting enhanced physical education using standardized curricula, the CDC's *School Health Guidelines to Promote Healthy Eating and Physical Activity*[4] recommends a comprehensive physical activity program with quality physical education as the cornerstone. These guidelines call for policy makers to "require students in grades K–12 to participate in daily physical education

that uses a planned and sequential curriculum and instructional practices that are consistent with national or state standards for physical education." Daily physical education for grades K–12 should total 150 minutes per week for elementary school students and 225 minutes per week for secondary school students.[4]

3. Modified School Recess

School recess is another opportunity for students to be physically active during the school day. Studies show that by providing adequate recess time along with age- and skill-appropriate equipment, children will increase their physical activity during these free play periods. Recess periods can be between 15 and 60 minutes in duration and include structured activity, or have a free play format that allows children to develop their own games and activities in a safe, supervised environment. On average, 96.8% of all elementary schools in the United States include a scheduled recess period on most days of the week.[13] At the school district level, 57.1% require that elementary schools provide students with regularly scheduled recess.[29]

The literature on modified school recess focused on availability of play equipment and implementation of structured recess activities. A 2006 study in Belgium provided children with game equipment (e.g., jump ropes, flying discs, plastic balls, plastic hoops, and beanbags) and activity cards depicting games that could be played with the equipment. Children who received the equipment had higher levels of activity during recess, compared to a control group that received no equipment.[30] These results were similar to those from two recent studies, one a randomized control trial and the other a longitudinal study.[31,32] Researchers found increases in activity during recess due to the introduction of playground equipment and the creation of specified activity areas on the playground. Taking a slightly different approach, investigators of two other studies chose to modify school recess by introducing structured activities. For instance, Scruggs et al.[33] reported an increase in physical activity during a fitness break consisting of completion of a 15-minute continuous obstacle course. However, the opposite effect was seen in a study that required children to participate in an assigned "recess activity of the week."[34] In that study, structured recess activities resulted in less physical activity compared to regular recess where children engaged in free play.

The CDC *School Health Guidelines*[4] recommend that elementary schools provide at least one 20-minute recess period daily to all students. In our review, we found that modifying recess with portable equipment, obstacle courses, and active games resulted in relatively small gains in physical activity over traditional recess; this was due to the fact that children are quite active during traditional recess.

4. Classroom Activity Breaks

Classroom activity breaks result in a substantial increase in children's energy expenditure,[4] and help children stay on task during subsequent lessons. These breaks, usually 10 minutes in duration once or twice per school day, add an activity component to the academic lesson. Since the activity is condensed into a short period of time and is often performed in a classroom, student participation is usually high. The percentage of U.S. schools that provide regular physical activity breaks during the school day, outside of physical education classes and recess, varies—43.5% of elementary schools, 66.8% of middle schools, and 22.2% of high schools provide breaks.[13]

The reviewed literature on classroom activity breaks consisted of randomized, controlled trials and cross-sectional studies analyzing the gains in energy expenditure resulting from the use of active lessons or activity breaks in classes. All of the studies focused on physically active academic lesson programs in elementary schools. One study involving activity breaks was performed in fourth-grade classrooms at 35 schools in Arizona.[35] This study required teachers to implement at least one 15-minute activity break during each school day. Compared to children in control schools, students receiving the intervention significantly increased the amount of time spent participating in physical activity during the school day. Stewart et al.[36] examined the impact of the TAKE 10! program developed by the International Life Sciences Institute (ILSI). This cross-sectional study showed that a program involving 10-minute activity breaks at least once during the school day elevated the children's physical activity energy expenditure into the moderate-to-vigorous range. The results of this study were similar to those seen in a randomized controlled trial performed in Beijing using a modified version of the TAKE 10! program.[37] These findings are consistent with other studies involving the Physical Activity Across the Curriculum[38,39] and Energizers programs.[40]

In 2006, 15.5% of school districts required elementary schools to provide regular physical activity breaks. The percentage is lower for middle and high schools, at 10% and 3.8%, respectively.[13] Despite the fact that few school districts have adopted policies on activity breaks, 43.6% of elementary schools, 66.8% of middle schools, and 22.2% of high schools report providing regular activity breaks during the school day.[13] If daily physical activity breaks were offered in elementary and middle school classrooms, millions of school children would be impacted. The *PAG Midcourse Report* concluded that there is "emerging" evidence in support of activity breaks.[12]

5. After School Physical Activity Programs

After school programs can provide physical activity outside of the school day. Most after school programs run for two to three hours per day, four to five days per week. These programs provide children and adolescents with supervised activities designed to encourage learning and development outside of the typical school day, and may include physical activity components, nutrition education, academic enrichment, mentoring, homework help, arts, technology, science, reading, math, and civic engagement.[41] Some studies found after school physical activity programs to be highly effective in increasing the energy expenditure in children. However, children seem to respond better to a "free play" environment and achieve greater levels of physical activity[42] compared to an environment that is highly supervised.

During after school programs, the reported time devoted to physical activity ranged from 15 minutes[43] to 80 minutes.[44] The activities included hula hoops, beanbags, parachutes, stretching, and toning,[43–45] soccer,[46] and dance classes.[47] Other programs promoted awareness of the importance of good nutrition and physical activity.[48,49] The physical activity components of these programs were found to vary in terms of cost, human resources, and participant burden.

Approximately 8.4 million children attend after school programs, and another 18.5 million would participate in such programs if they were available.[50] Research suggests that students who attend high quality after school programs (with a physical activity component) acquire more physical activity.

6. Modified Playgrounds

Schoolyards give children opportunities to be physically active during recess and outside of school hours. In our review, we identified three studies that examined the impact of school playground modifications. In these studies, preschool and elementary school playgrounds were modified to promote more activity. The results indicate that when playground equipment is provided and/or playground surfaces are painted, children's physical activity increases significantly. Stratton et al.[51] found that children who used a playground with markings and no game equipment obtained more physical activity during recess, compared to children who used an unmarked playground with limited equipment. Hannon et al.[52] examined the effects of playground equipment on physical activity levels among preschoolers. Providing playground equipment (i.e., hurdles, balance beams, tunnels to crawl through, etc.) caused children to engage in more physical activity, compared to usual play equipment (i.e., balls, sand box shovels, and hula hoops).

Other studies have examined the combined effects of playground markings and play equipment. Ridgers et al.[53,54] studied the effects of playground markings and equipment on children's physical activity. These studies found that providing playground markings and play equipment such as hula hoops, jump ropes, and balls resulted in a greater percentage of children engaging in moderate and vigorous physical activity.

There is "suggestive" evidence that modifications to school playgrounds increase children's physical activity levels during recess and outside of school.[12] Thus, school officials could consider adding playground equipment, colored markings on playground surfaces, and play equipment such as balls, hula hoops, and other game equipment to their school yards.

7. Walk/Bike to School Programs

For children, active commuting to and from school can yield substantial increases in physical activity. In 1969, 47.7% of children in grades K–8 walked or biked to school, but by 2009 this had declined to 12.7%.[55] In 2006, only 17.5% of school districts in the United States reported having a policy that supported or promoted walking or biking to school.[13] Still, despite this low level of adopted policy, 44.3% of all schools indicated that they supported walking and biking to school.[13]

Some of the studies we examined compared activity levels of children who walked to school with those who were driven to and from schools.[56,57] These studies found that children who walked or biked to school had higher levels of physical activity than those who were driven. Thus, there is "suggestive" evidence that school-based approaches to promoting active transportation can increase youth physical activity.[12] Other studies evaluated the effectiveness of promoting active transportation through awareness, family involvement, and contests, and reported a 114%

increase in biking and a 64% increase in walking to school.[58] Another study introduced changes to the built environment (i.e., sidewalks, street crossings, and traffic controls) and found that sidewalks and traffic controls have the greatest effect on walking and biking to school.[59]

A national policy designed to enhance children's ability to walk or bike to school is the Safe Routes to School (SRTS) program. It was established in 2005 under the Safe, Accountable, Flexible, and Efficient Transportation Equity Act—a Legacy for Users (SAFETEA—LU). In 2012, a new transportation bill called Moving Ahead for Progress in the 21st Century (MAP-21) folded SRTS and other programs into the Transportation Alternatives Program. The SRTS program supports projects that increase the safety of walking and bicycling routes to school, and encourages children and their families to actively commute between home and school.[60]

Local policies also impact children's ability to walk or bike to school. Transportation Planning Organizations (TPOs) within local governments design and oversee construction of sidewalks, bike lanes, and curb ramps, as well as installation of traffic-calming measures such as crosswalks and flashing lights to alert motorists to slow down in school zones. Provisions for bicycle parking are also needed to encourage children to ride to school. Law enforcement policies such as increased fines for speeding in school zones or traffic cameras can slow traffic and make it safer for children to walk or bike to school.

School boards also set policies that impact children's ability to walk or bike to school. School siting is one important consideration. Some school boards have policies that set minimum land area standards for new schools. While this allows for expansive athletic facilities surrounding the school, such policies may be detrimental because large tracts of affordable land are usually located on the edge of town.[8] School policies can be written to encourage the construction of smaller neighborhood schools, which increases the potential for students to access them on foot or by bicycle.[61]

8. Parks

The built environment is an important factor that may influence physical activity.[62–67] A number of studies have examined whether community parks or enhanced access to places for play are related to children's physical activity levels. Most of the studies we reviewed were cross-sectional in nature. Some studies compared physical activity levels of children who had lived in close proximity to parks with those who lived farther away, while other studies examined the impact of park renovations on youth physical activity.

Four studies looked at the association between access to parks and recreational facilities and physical activity.[64–67] Access (defined as proximity) to parks was measured using various distances or buffers around youth's residences which were determined using Geographic Information Systems (GIS). Children living in neighborhoods with more park land tended to be more active, compared to those living where parks were scarce.[66] However, while the results of these studies were statistically significant, their impact on physical activity levels of youth was minor.

Other studies examined the impact of park and playground renovations on children's physical activity.[68–70] Physical activity was usually assessed in these studies by direct observation. Results from these studies indicate that after renovating a park area, children's physical activity increased. However, since some studies did not distinguish between children, teens, and adults, the size of the effect on youth's physical activity levels could not always be determined.

Several types of policies have been enacted to increase the number of new parks established in an area.[71] For instance, municipalities can require land developers to establish park space when planning new property developments, or they can charge developers "impact fees" to establish new parks. In addition, a portion of local sales taxes can be dedicated to parks and open space acquisition, and federal, state, and local properties can be repurposed to build parks. Parks can also be funded through user fees. The *PAG Midcourse Report* subcommittee concluded that there is "suggestive" evidence that built-environment changes, including increased access to parks and recreation facilities, are effective.[12] However, more research is needed to evaluate the impact of this strategy.

9. Sports Teams

Public health researchers have often neglected the role of intramural and extramural sports teams and clubs in youth physical activity. These activities are usually conducted on school property, under the supervision of coaches. They provide youth, especially those at the middle- and high-school levels, with valuable opportunities to acquire physical activity. In 2011, 58.4% of high school youth played on at least one sports team run by their school or community.[72] Although sports participation undoubtedly results in an enormous amount of physical activity for youth who participate, it was not possible to estimate the magnitude of the effect due to an inadequate number of studies.

10. Joint Use Agreements

Joint use agreements are formal contracts between separate parties (e.g., a school district and a city/county) laying out the terms and conditions for the shared use of public property.[61] Usually, each entity helps fund the development, operation, and maintenance of the recreational facilities. In this way, the costs and liabilities associated with the facilities are shared. For example, a school and a swim team might share a pool, or a school might allow a local soccer league to use its fields on weekends.[73] Preliminary research suggests that joint use agreements have the potential to increase levels of physical activity, while also providing safer environments in which to be physically active.[74] However, there are insufficient studies to determine the impact of joint use agreement policies on youth physical activity.

Conclusions

The impact of policy interventions and built-environment changes on physical activity of school-aged children can be estimated. If converted to a common unit of measurement (i.e., kilocalorie), the impact of various interventions can be compared. Physical education and classroom activity breaks have the greatest effect on physical activity levels in youth,[9] as well as the strongest evidence base behind them.[12]

Schools and communities can play major roles in providing opportunities for increased physical activity among youth. If specific policies were implemented, the combined effect could be substantial. Some school policies can be implemented during the school day, while others could cover use of school grounds and facilities outside of the weekday hours of operation. Thus, school officials and community leaders should consider the many ways they can help students be physically active during and outside of the school day.

Urban planners, traffic engineers, and citizen groups can work together to ensure that children and teenagers can safely walk and bike to school. Parks and recreation professionals can help to ensure that children and teens have outdoor places to play.

School-based policies and built-environment changes require increased levels of funding, under many circumstances. Thus, federal and state legislators, as well as city officials, should realize that they also have important roles in ensuring that schools and communities promote active lifestyles in young people.

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