

National Plan for Physical Activity
Education Sector

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Introduction

For purposes of this paper, the Education Sector will be defined as all children/youth in pre-K-12th grade in public and private schools, with a secondary focus on students in higher education. The Education sector will also be analyzed in terms of policy and funding responsibilities and issues at federal, state, and local school district levels.

In 2008, public elementary and secondary enrollment approached 49.8 million students, 34.9 million in prek-8th grade and 14.9 million in grades 9-12. Private K-12 enrollment was 5.1 million students (1). The average child spends approximately 1300 hours per year in school. The percentage of racial/ethnic minority students in public schools reached 43% in 2006, up from 22% in 1972, due largely to the increase in Hispanic students. The distribution of minority students differs across regions of the USA, with minority (55%) exceeding White enrollment (46%) in the west. Within states, similar differences are found among urban, suburban and rural school districts.

Schools have a long history of addressing the health of children/youth, beginning in colonial times when schools addressed infectious diseases, thus it is not surprising that the education sector is now called upon to address the overweight/obesity epidemic among children/youth. “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, 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” (2, p:7). In 2004, with the passage of the Child Nutrition and WIC Reauthorization Act, The United States Congress required schools that receive funds from this act to establish local school wellness policies that include provisions for healthy eating and physical activity, thus substantially expanding school responsibility for providing physical activity for children and youth. “Schools could become the central element in a community system that ensures that students participate in enough physical activity to develop healthy lifestyles” (3, p:1215).

Schools traditionally have been centers for physical activity. Historically, schools were built within relatively compact residential neighborhoods within walking or biking distance for students (4). Schools typically provided routine physical activity through physical education classes, recess, and served as centers for community activity including child/youth activity after school. More recently, however, larger schools, requiring larger land spaces, have been built on the periphery of communities, with the vast majority of students bussed or driven to elementary and middle schools. These developments require educators to think differently about how to provide sufficient physical activity opportunities for students. 21st century children spend less time playing outdoors, have fewer playmates from less diverse backgrounds, a more restricted range in which they can move freely, spend increasing time with electronic media indoors, have increased engagement in structured activities managed by adults, and are less likely to walk or cycle to school (5). It is also clear that parental concerns about safety, injury and crime restrict outdoor play.

The Centers for Disease Control and Prevention (CDC) through its Coordinated School Health Program has led the national focus on health behaviors that can ameliorate the leading causes of rising health costs, among them being inadequate levels of physical activity and inadequate educational programs that enable children and youth to want to become and stay physically active. This new focus on the education sector's responsibility for adequate levels of physical activity within the school day and adequate educational experiences that influence children and youth to adopt and value a physically active lifestyle has developed within the same time span as the national concern that schools become more successful in educating all students, especially in the areas of reading and mathematics, as exemplified by the federal influence exerted through the No Child Left Behind (NCLB) act of 2001. NCLB requires states to develop assessment and accountability measures to verify performance increases in the subject areas of reading and mathematics.

In response to the accountability measures of NCLB elementary schools have increased the amount of time devoted to reading and mathematics instruction, nationally on average by 47% in reading, as a percentage of total instructional time in the school day,

and 37% in mathematics (6). Increased classroom time for these subjects was balanced by a reduction of time in other subjects. Of particular interest to this White Paper have been the decreases in time for physical education (35%) and recess (28%).

National goals from Healthy People 2010 include a target for moderate physical activity (MPA) of 30 minutes per day for 5 days per week, 20 minutes per day for 3 or more days per week in vigorous physical activity (VPA), 150 minutes per week in physical education (PE) for elementary students and 225 minutes per week in PE for middle and high school students. Some states are considering adding time to the daily schedule or extending the number days in the school year as a response to the accountability pressures of NCLB and the more recent concerns about child/youth overweight and obesity. In 2006, the province of Quebec added 90 minutes to the elementary school day with the dual goals of protecting time for math and language arts and using the additional time for French as a second language, physical education, and arts education.

There is no evidence that time in PE/PA has a negative influence on student achievement. To the contrary, evidence (7) reveals that appropriate levels of physical activity among children and youth, including sufficient time in moderate to vigorous physical activity (MVPA), are positively related to increased on-task classroom behavior, cognitive development, and academic performance. A recent review of research (8) concluded that physical activity has a positive effect on academic performance, that adding weekly time to physical education is related to gains in academic performance, that adequate levels of PA improve cognitive function, and that MRI results show a positive dose-response between PA levels and frontal-lobe brain activity, an important area for executive functions.

Federal and State Responsibilities for Education

If the quantity and quality of physical activity opportunities for preK-12 grade students is to improve, it will require significant policy initiatives at federal and state levels, policies that guide and fund PE/PA programs in local school districts. It is important, therefore, that the roles the federal government and state governments play in

the formation, implementation, funding, and accountability for policy initiatives be clearly understood.

The U.S. Constitution does not designate a federal role for public education, leaving the primary responsibility to the states. While states differ somewhat in their systems of public K-12 education, in terms of organization, funding, and oversight, a state-level board, most often called the State Board of Education, has the primary responsibility for the oversight of the K-12 system. Each state typically has a chief state school officer, designated as a superintendent or commissioner of education, directing the work of the state department of education on behalf of the state board. Education policy and education funding, however, are typically the responsibility of state legislatures. State policy, however, is implemented at the local school district level. State policies without adequate funding to implement the requirements defined by the policies become unfunded mandates for districts, reducing substantially the likelihood that the policies will be successfully implemented.

Significant federal involvement in education began following the 1954 Supreme Court decision in *Brown vs. Board of Education* that declared racial segregation in schools to be discriminatory, thus violating the 14th amendment to the U.S Constitution, which guarantees all citizens equal protection of the laws. The Civil Rights Act of 1964 and the 1972 Emergency School Aid bill both mandated the dismantling of dual school systems in southern states and funded costs associated with that policy agenda.

Beginning with the 1965 Elementary and Secondary Education Act (ESEA) and the 1975 Disabilities Education Act (IDEA), the federal government increased its involvement in and funding for K-12 education, focusing federal education policy on issues of fairness and equity. Following the 1983 publication of *A Nation at Risk*, however, federal education policy began to widen its focus to include an “excellence” agenda, related to the economic benefits of education, in addition to its equity focus, leading to the 2001 reauthorization of ESEA as NCLB. NCLB introduced accountability measures in the form of “adequate yearly progress” (AYP), using total student proficiency rate and rates achieved by student subgroups as primary determinants of AYP. NCLB now authorizes 45 programs in 10

sectors funded at nearly \$25 billion in fiscal year 2008. The largest of these is the Title I program to improve the education of disadvantaged students (\$14.5 billion in FY2008). The Reading First program focuses specifically on the literary skills of K-3 children (\$393 million in FY2008) and Early Reading First for preschool aged children (\$113 million in FY2008).

This history suggests that improvements in opportunities for PA in K-12 education will require federal and state policy initiatives that include funds to implement the initiatives, as well as accountability measures for seeing that PA programs are being implemented according to policy protocols, and assessment of the efficacy of those initiatives. Federal grants as a share of total K-12 funding have grown from 7% in 1992 to 9% in 2005 (9). Per pupil spending among the states has leveled out or declined in recent years, due likely to an increasing reliance on local property taxes to fund schools. In the 1990s, state governments had taken on a greater burden of school funding, most typically to improve the funding equity among districts with differing levels of wealth, but in the 2000s, the burden has shifted back to local districts, with the result that funding of districts in poorer localities has weakened as demands on those districts are intensified.

Methods

This review will examine research that investigated PreK-12 school-based opportunities for increasing PA and appropriate levels of MVPA, as well as educating students to become and stay more physically active, such as, early childhood programs, physical education classes, recess, classroom activity breaks, and interventions that utilize multiple components such as community and/or parental involvement. An effort will also be made to evaluate issues related to PA for students in higher education, although the evaluation will necessarily rest on reports rather than PA intervention studies.

The Pre-K and kindergarten PA/PE issues will be extracted from the limited research studies in that area, including several reviews. The analysis of school-based physical activity interventions will rely on authoritative reviews that had rigorous inclusion criteria for the selection of individual studies. These studies range from a single focus on physical education to school-wide interventions that include health-related

cognitive content, nutritional changes, PA opportunities in addition to PE, and parent and community involvement. The review of recess will draw on individual studies and several reviews. The review of research on classroom activity breaks will draw on individual studies, as the research is sufficiently recent to have undergone authoritative reviews.

The National Association for Sport and Physical Education (NASPE) has argued that the primary goal of physical education is for students to have the knowledge skills, and confidence to enjoy a lifetime of healthful physical activity. The curriculum concept that has emerged to achieve that goal is health-related physical education (HRPE), “which is a process not a specific outcome such as physical fitness” (10:349). This paper will therefore review evidence on the degree to which PE/PA activities in school influence students to become and remain active in discretionary time outside of school hours and research on motivational factors that influence students to pursue PA in discretionary time.

The Education Sector is policy driven, sometimes emanating from federal legislation, but primarily driven by state legislation that guides education policy in local school districts. The policy review will focus primarily on evidence of initiatives at state and local district levels since the 2004 reauthorization of the Federal School Lunch Act requiring all school districts that receive federal funds to support school breakfast and lunch programs to create local school wellness councils that address issues of nutrition and physical activity in the schools in their district.

Early Childhood Education

Between 1970 and 2006, children ages 3-4 had the largest increase in enrollment rates in education, mostly in center-based preschool settings staffed by an estimated 437,000 teachers. About 75% of the nation’s 4-year olds attend a preschool center (1,p.7). In 2006-2007, the federal Head Start program served 11% of 4-year-olds and 8% of 3 year-olds with a budget of \$6.2 billion.

The research on physical activity in early childhood education sorts into two categories; namely studies that seek to reduce overweight/obesity and studies that seek to increase physical activity. Some research studies have targeted overweight/obese children

with interventions that rely primarily on nutritional changes at preschool and parental/caregiver education. Many of these studies have achieved statistically significant reductions in BMI and serum cholesterol. Most noteworthy of these has been the Healthy Start project, a multi-component preschool cardiovascular health intervention (11) focusing on modified meals and snacks served by the food service and reductions in the fat content of milk and other dairy products, and increased nutrition knowledge. Children in intervention schools showed a significant decrease in total serum cholesterol and were significantly more likely to have cholesterol levels in the normal range. The conclusion reached by the authors was that “multicomponent preschool programs can be effective in promoting the adoption of heart-healthy behaviors and reducing risk factors for CVD. Similar to school-based programs and central to successful outcomes are theoretically derived developmentally appropriate interventions that address knowledge and behavior skill training, provide participatory opportunities for children, and target dimensions of the preschool environment that extend beyond the classroom” (11:p2271).

Research on physical activity in early childhood education has shown that 54% of children (10,316 observed in 39 studies) reached the NASPE recommended level of 60 minutes in activity per day and that boys were typically more active than girls (12). A study (13) designed to assess PA in several preschools showed that boys had significantly more MVPA and VPA than girls, that Black children were more physically active than white children, but, most importantly, that the preschool attended accounted for a substantial fraction of the variance in children’s PA, showing that the characteristics of the school had a stronger influence on the activity levels of the children than did the children’s demographic characteristics.

Other research (14) has shown that children in supportive environments (activity opportunities, portable play equipment, fixed play equipment, PA training and education) had higher mean levels of PA compared to centers with less supportive environments. An intervention as simple as adding activity-friendly equipment to an outdoor preschool playground resulted in decreased sedentary behavior and a significant increase in light, moderate, and vigorous PA as measured by accelerometry (15).

The evidence supports the notion that multi-component preschool programs that provide developmentally appropriate interventions for physical activity that include both free-play in activity-friendly settings as well as organized physical education time, heart-healthy preschool food offerings, and nutrition/activity education can be effective in helping young children to develop healthy lifestyle habits. Longitudinal studies have found that the most active young children have much less body fat when they reach adolescence, showing that activity behaviors affecting lifestyle can be established in the preschool years (16).

It is worth noting that evidence from reading education suggests strongly that children who leave the 3rd grade reading below grade level have a difficult time catching up and are likely to be at risk throughout the remainder of their K-12 education. There is also evidence that young children who leave the 3rd grade overweight/obese are likely to remain so throughout adolescence and into adulthood. Thus, if there is a choice of focusing resources, it may well be that the preK-3rd grade years are the most important.

K-12 Education

Physical Education Interventions

The outcomes described in this section were compiled from six reviews using rigorous inclusion criteria (17, 18, 19, 20, 21, 22). The number of intervention studies focused on elementary school was larger than those focused on middle or high schools. Studies also differed in the scope of the intervention; that is, some focused primarily on PA interventions, mostly within physical education (PE), others used a combination of PE/PA interventions along with classroom foci on healthy lifestyles, while others focused on PA interventions, classroom foci, and changes in the nutritional quality in school food services, while other PA interventions included community and/or parental elements.

The following are key conclusions reached from these review studies.

- Elementary studies targeting physical activity achieved modest success in increasing activity levels of children but only a few studies also show increases in out of school PA

- Fitness-based interventions increased fitness levels
- Interventions in PE classes typically achieved increased MVPA within class time
- Studies that were of short duration and did not include MVPA goals seldom achieved positive outcomes
- Studies with treatment duration of more than 6 months had stronger effects than briefer trials
- Curriculum only studies, typically delivered in classrooms, seldom showed significant influence on student PA
- While PE interventions increase PA they seldom impacted measures of body fatness or CV risk factors – this was likely due to PA increases not being large enough or for a sufficient length of time to elicit significant changes in body composition
- Programs of moderate to intense PA 30-60 minutes/day for 3-5 days/week led to a reduction in adiposity for overweight children and adolescents but did not influence the % of body fatness in normal weight children and adolescents
- Longer, more intensive sessions (80 m/day) were successful in influencing the % body fat of normal weight children and adolescents
- Studies that compared treatments delivered by certified PE teachers and those delivered by classroom teachers showed stronger outcomes for the certified PE teacher classes
- One study showed that increases in PA in PE specialist-taught classes was greater than those in classes taught by classroom teachers who had inservice training for the study, which, in turn, was greater than those for classroom teachers in control classes
- Elementary school studies that targeted PA interventions for overweight children and provided counseling and support for their parents resulted in reduced adiposity
- Several large, high-quality trials showed strong outcomes for school-based interventions that included family or community involvement
- Cross-sectional studies have shown that higher levels of PA among students were related to better measures of wellness, stronger self-image and body-image.

- There appears to be a strong relationship between self-efficacy and PA behavior, although the causal nature of the relationship is not fully established.

One of the studies most frequently cited in the PA literature was a 6-year study in Crete, Greece, focused on students in grades 1-6 (23). The intervention, based on the Know Your Body program, (13-17 hours/year) included two PE lessons/week, classroom sessions 4-6 hours/year delivered by PE teachers, 3/5 homework activities/year completed by parents, and two parental meetings at the school each year. After the initial 3-year intervention, the children in the intervention schools had significant improvements in BMI, reduced body fat and cholesterol, more self-reported leisure PA, higher increase in health knowledge, and greater reported increase in outside-of-school PA than control students (281 vs. 174 m/week). These effects were maintained at the 3-year follow-up (+38 vs. -13 minutes/week). The amount of time devoted to the intervention was modest (at most 51 hours over 3 years), but included multiple components in school and involved parents. Most importantly, the intervention was applied consistently for three years and engaged parents throughout the cycle.

Interventions Specific to Girls

As stated above, several studies have found that girls typically have less PA involvement in PE classes than boys and that some interventions have been successful for boys but not for girls. This tends to confirm evidence that PA for girls tends to decline as girls reach puberty and continues to do so throughout adolescence (24).

The largest national intervention study has been the multi-site (36 middle schools conducted at six university-based field sites representing diverse geographic locations and populations) Trial of Activity for Adolescent Girls (TAAG) (25, 26, 27). The TAAG intervention consisted of four major components: physical education, health education with PA homework challenges, partnerships among universities, schools and communities to promote PA, and promotional activities that included social marketing. Furthermore, a

“program champions” initiative developed plans to institutionalize TAAG in the schools following the 2-year trial. Primary results from TAAG were as follows.

- A very high percentage of teachers attended TAAG workshops
- Intervention components were delivered by staff to teachers with high fidelity (84-97%) but with lower fidelity (18-93%) by teachers to students
- The physical activity program for girls in intervention schools increased from a mean of 10 programs per school to a mean of 16 and 15 in years 1 and 2 respectively with no change in control schools
- Time and proportion of lessons spent in MVPA and VPA differed by field site with an average of 13.9 minutes MVPA and 4.8 minutes in VPA which fell short of the Healthy People 2010 objective of 50% of class time in MVPA/VPA
- Collaborations with outside agencies to promote PA doubled in intervention schools but did not change in control schools
- Girls who attended community programs overwhelmingly enjoyed them
- TAAG intervention goals were completely met for 18 of 56 goals over two years, while another 17 goals were within 10% points of meeting goals
- Variables positively associated with PE class enjoyment were PA levels, perceived benefits of PA, self-efficacy for leisure time PA, and perceived school climate for girls’ PA as influenced by teachers
- Younger girls were more active than older girls
- More PA with friends was significantly related to higher self-reported PA.

The Lifestyle Education for Activity Project (LEAP) was a group-randomized field trial conducted at 24 high schools with 2744 girls participating, 48.7% of whom African American and 46.7% White (28). The intervention consisted of modifications in physical education, health education, school health services, and enhanced school environments, all designed to provide girls with activity experiences that were culturally relevant and positive. LEAP 2 (29) was a follow-up study to ascertain whether the intervention in the 9th grade would show sustained results in the 12th grade. Primary results for LEAP were as follows.

- The intervention resulted in an increase in girls' self-efficacy which led to increased PA
- Girls in the intervention schools that most fully implemented and maintained the intervention were more likely than girls in the other schools to participate in an average of one or more sessions of vigorous PA per day
- LEAP 2 follow-up data showed that 45% of the girls in the intervention schools reported VPA during an average of 1 or more 30-minute time blocks per day over a 3 day period compared to 36% of the girls in control schools.

It is clear that PA programs in schools need to ensure that girls have attractive opportunities to learn skills and engage in gender-relevant physical activities and be encouraged and supported to become and stay physically active.

A Comprehensive Innovation

The most comprehensive innovation reviewed was in the Canadian province of British Columbia. Responding to data on child/youth overweight in the Province and survey evidence showing that grade 1-7 schools were not providing appropriate PA and healthy school foods, the BC Ministry of Education partnered with the BC Ministry of Health and the BC Ministry of Tourism, Sport and the Arts (MTSA) to create Action Schools! BC (AS! BC) (30). A study group was formed to review current evidence on the dissemination of health promotion innovations and to develop a model that promoted collaboration and exchange of knowledge across sectors. A research partnership was formed among five BC agencies (Health, Education, 2010 Legacies Now, Provincial Health Services, and MTSA). Following approval of provincial funding, partnerships were formed both across sectors and vertically from practitioners to decision makers. A multidisciplinary evaluation team was formed to conduct school and community-based research trials and evaluate primary health outcomes.

The AS! BC was defined by the participating agencies as a best practices model designed to assist schools in creating individualized action plans to promote healthy living. Six "Action Zones" were identified. *School Environment* was designed to make healthy

choices easy choices. *Scheduled PE* provided best practice resources to support the Ministry of Education's prescribed learning outcomes for PE. *Classroom Action* provides daily PA and healthy eating activities for the classroom. *Family and Community* fosters partnerships with families and community practitioners to encourage PA and healthy eating. *Extra-Curricular* supports a variety of opportunities for students, staff and families to engage in healthy living before and after school. *School Spirit* celebrates the benefits of healthy living for the whole school.

A pilot study (31) randomly assigned 10 elementary schools to Usual Practice (UP), Liason (LS), or Champion (CS) conditions. Teachers in the LS and CS conditions were provided the same training but differed in the level of facilitation provided during the study. After the 11-month intervention, significantly more PA was delivered weekly in LS (+67 minutes/week) and CS (+55 minutes/week) schools than in UP schools. Data from activity logs showed fidelity to the model in the LS and CS schools. The AS! BC model provided improved provision of resources, positive changes in school climate, and improved communication and program flexibility, showing that the model was effective and feasible. The goal then became to disseminate the model throughout the Province and to evaluate the dissemination through baseline and follow-up testing over a two-year period.

The next move was to disseminate and test the AS! BC Healthy Eating program, designed as a whole-school model using the six AS! BC Action Zones to increase the intake of fruits and vegetables (FVs) in schools (32). Ten schools were recruited to participate, five randomly assigned as intervention schools and five as matched usual practice (UP) schools. Evaluation assessed both the fidelity of the intervention and the outcomes. Significant differences were found in FV servings and FV variety favoring the intervention schools. Teachers implemented a mean of 64% of the requested classroom dose and School Action Teams implemented activities across 80% of the whole-school model.

Another study (33) used a 16 month cluster randomized controlled trial to assess the impact of AS! BC on student academic performance using the Canadian Achievement Test (CAT) as the outcome measure. Results showed that PA delivered by teachers to

students in intervention schools increased by 47 minutes/week. While students in UP schools had significantly higher CAT scores at baseline, there were no significant differences between students in treatment and control schools at follow-up, suggesting that students from treatment schools increased their academic performance.

By the end of October 2008, 1,573 AS! BC schools were registered, with 16,567 teachers and administrators taking part in schools with a total enrollment of 438,180 students (34). These schools were prepared to implement the model through the work of 70 trainers who delivered 2,330 workshops. Support for schools and classroom teachers in AS! BC is substantial. Classroom teachers in grades 1-3 are provided CDs/DVDs for dance, rhythm activities, “everybody moves manuals,” and a host of other classroom PA activities, along with classroom action breaks materials, and Canadian Active Living Fitness Circuit charts, as well as equipment to support physical activity in the classroom and on the playground. Classroom teachers in grades 4-7 get jump ropes, playground balls, exercise bands, and hand grippers for use in their classrooms and on playgrounds. Each Action! BC elementary school gets a “playground exercise circuit” developed with a unique circuit outlined on the playground. Each middle school teacher gets skip ropes, playground balls, wristbands discs, reaction balls, exercise bands, scarves, bean bags that are used in classroom workouts, playground fitness circuits, playground games, DVDs for fitness workouts, and DVDs for class activity breaks.

In September 2008, the BC Ministry of Education announced a Daily Physical Activity (DPA) requirement, defined as endurance, strength and/or flexibility activities, for all provincial schools. Grades 1-9 must offer a minimum of 30 minutes/day and students in grades 10-12 must document and report a minimum of 150 minutes/week of MVPA as part of their Graduation Transitions Program. It should be noted that few elementary schools in BC have certified PE teachers, thus the burden falls primarily on classroom teachers. This model brings together government policy and leadership, adequate training of education professionals, adequate provision of resources for schools, and a clear set of expectations for PA and healthy eating. The model also has the advantage of research initiatives to assess the degree to which the model is being implemented appropriately and the degree to which expected outcomes are achieved.

Recess

Recess is a break during the school day when elementary school students have the opportunity to participate in a period of active play. Article 31 of the United Nations Convention states that recess is the right of every child and that taking away recess, whether as a disciplinary measure or abolishing it in the name of work, infringes on that right.

The 2006 CDC SHPPS data showed that 96.8% of schools reported having regularly scheduled recess in at least one grade, with 30.2 minutes per day average allotted time over 4.9 days per week. The Center on Education policy (6, p.4), however, showed that NCLB has had a detrimental effect on recess with a 28% decrease in time allotted (as a total of instructional time). The same report revealed that recess had been most sharply curtailed in districts with at least one school identified as “in need of improvement” under NCLB. These are typically high minority enrollment, high poverty, and urban districts. Nearly 40% of the nation’s schools have modified, deleted or are considering deleting recess from the daily elementary school schedule according the American Association for the Child’s Right to Play.

For some time now, the Atlanta school district has not included playgrounds or playground equipment when it builds new elementary schools. Schools that eventually do develop playgrounds do so through private donors and/or local PTA groups. In most large school districts throughout the nation, one is likely to find better playgrounds in elementary schools serving more affluent neighborhoods.

Research on issues related to physical activity during recess (35, 36, 37, 38, 39) support the following conclusions.

- Time spent in recess does not detract form academic learning but rather enhances it through children being more attentive and on-task in classrooms
- During recess, children make choices, develop rules for play, and organize their own games/activities, contributing to social development

- Children do engage in PA and MVPA during recess but the % of time is influenced by the organization and activity opportunities provided by playground design and equipment
- In most studies, PA outcomes for younger children were greater than for older children
- PA intervention effects are greater as the daily duration of recess increases
- Interventions typically show stronger effects for boys than girls
- The most promising research uses colorful/fluorescent markings painted on school playgrounds to delineate activity areas to encourage different levels and types of PA. These studies show increases in PA, MVPA, and total energy expenditure.
- Studies also show that playground designs decrease bullying, playground confrontations, and playground injuries.

Adequate time for recess should be a component of every school day and recess play areas should be designed to help children engage in enjoyable PA and MVPA. Recess activities should be closely monitored to ensure that all children have equal opportunity and that playground confrontations and bullying is eliminated.

Classroom Activity Breaks

A Classroom Activity Break (CAB) is a short (10-15 minutes) time period within or between subject lessons. During CABs students engage in PA that can be done within the confines of the classroom. A number of CAB programs have been developed and are available to classroom teachers (Take 10!, Energizers, Learning on the Move, Lift Off! and Brain Breaks). Most of these integrate academic concepts with the particular physical activity, such as spelling shuttle runs, word jumps, the busy body, and spelling vocabulary relays.

Research (40, 41, 42, 43) indicates that:

- CABs reduce classroom disruptions and contribute to improved on-task behavior among students during academic instruction
- CABs contribute to the daily accumulation of MVPA

- In studies with control groups, students in classes with CABs had significantly more in-school steps than students in control classrooms, both through self-report and objective measures.

Physical Activity Across the Curriculum (44) is a 3-year elementary school curriculum randomized-control study in 24 schools to test the efficacy of CABs. Classroom teachers were trained in the Take10! CAB model. Both treatment and intervention classes were observed using the SOFIT observation system (4,515 students in 2nd-5th grade).

Students in intervention classes were engaged in significantly more PA than students in control classes. As teachers in intervention classes increasingly modeled active lessons, student SOFIT scores increased. Students in the intervention classes rated their lessons as somewhat enjoyable (57%) or very enjoyable (36%) while only 6% were rated as neutral, where as 60% of the control classes were rated as neutral. CABs show great potential to providing a significant percentage of daily physical activity for students.

Motivational Influences for Physical Activity

Research on motivational influences for physical activity among children and youths depend primarily on two theoretical approaches that have more commonalities than differences. Social cognitive theory (45) suggests that perceived self-efficacy is a dominant factor influencing participation in and enjoyment of PA. Self-efficacy, the belief that one is capable of performing in a certain manner to attain certain goals, develops over time when students experience success and enjoyment in PA. Self-determination theory suggests that optimal development is the result of students developing competence, autonomy and relatedness in their activities. Research in sport psychology has found four consistent predictors of motivated PA behavior among children: developing and demonstrating competence, providing opportunity for autonomy and choice in activity, fostering positive peer and adult relationships, and maximizing enjoyment while minimizing anxiety (46). It is also clear that the immediate context for activity exerts a strong positive or negative influence on the activity levels of children and adolescents. Schools that have attractive indoor and

outdoor facilities for PA and support for PA from school staff influence students to become and stay active.

Research on student motivations suggests that in physical education classes, recess breaks, and classroom activity breaks students need to gain sufficient skill in activities to feel competent performing them, that peer relationships in activity are important, and that the activities have to have a high “fun quotient” for the students. It seems especially important that children in the K-3 years develop competencies in a range of fundamental motor skills that provide the basis for engagement in popular sport, dance, and fitness activities. A seven-year longitudinal study (47) assessed children’s (mean age of 10.1 years) motor skill proficiency as part of a school-based PA intervention. Seven years later approximately half of the students originally assessed were assessed with follow-up measures. The investigators concluded that students with higher object control skills in their early years had significantly higher self-reported MVPA and cardiorespiratory fitness.

The “skill themes” model (48) for K-3 PE seems especially relevant to ensuring that young children acquire a level of motor-skill competency. Skill themes include locomotor skills (traveling, fleeing, chasing, dodging), non-manipulative skills (jumping, landing, balancing, weight transfer, etc.), and manipulative skills (kicking, throwing, catching, striking, dribbling, etc.). Children learn these skills while engaging in a series of activities that have a high fun quotient, building the self-efficacy that increases their motivation to become and stay physically active. A continuing problem, however, is the attractiveness and availability of sedentary activities in the after-school hours, particularly the popularity of electronic games.

For adolescent students, grades 7-12, the issue of motivation for PA becomes more important as PE time in schools diminishes as they progress through middle and high school. Because few schools offer intramural activities, adolescent boys and girls must find ways to be active within the community. A recent study (49) concluded that the key factors influencing boys and girls activities were the importance of fun, having time to be physically active, the perceived benefits of activity, being active with friends, the

influence of adults, and the importance of being able to access facilities in their neighborhoods. Another study (50) found that family cohesion, parent-child communication, and parental engagement were positive predictors for both boys and girls engagement in PA during discretionary time. For both boys and girls, self-esteem mediated the relationship between parental influence and PA. Welk (51) suggested that parental involvement (family walks, playing catch, etc.), parental facilitation (providing access to facilities or providing equipment, etc.) and parent role modeling of an active lifestyle were key variables influencing the PA of their children.

Another source of motivation, especially for high school students, is providing choice of activities in PE. In many HS programs students are scheduled into PE for a particular period of the school day. When they go to the gymnasium for their first class, they typically have no idea what activity they will be doing. Students who are in HS PE programs which allow students to choose their activities as part of their scheduling process will likely be more motivated to learn.

A Matter of Time

It is clear that time is a crucial variable for promoting PA in the context of preK-12 education. The average length of the school day in America is 6.5 hours/day for 180 days/year. PE classes are typically scheduled for 30 minutes in elementary schools and 50 minutes in middle and high schools, with total time/week dependent upon the number of days/week for PE. Recess periods are typically for 15 minutes/session.

Time in PA is impacted by a number of variables. Smaller spaces reduce PA, as do most indoor activities. Weather that is too hot, cold, or windy reduces PA. Larger class sizes reduce PA, as do equipment/student ratios in activities (think of a class of 28 students learning to pass in volleyball with only 4 volleyballs available). Activities that eliminate students or require taking turns reduce PA. Skilled teachers minimize time spent in managerial activities and optimize time spent in activity. Teachers who commit to a health-related physical education (HRPE) tend to choose activities that have higher MVPA requirements; e.g., soccer rather than softball or aerobic dance

rather than badminton. HRPE can be done successfully through sport activities as well as fitness activities.

Exemplary Innovations

PE4Life (52) was founded as a middle school program in Naperville, Illinois in 2000. Students spent 1 day per week working on fitness apparatus and recording their workout results, 1 day per week in a cardio walk/run session, and 3 days per week in sport/fitness activities designed to produce high levels of MVPA. Technology to track student progress was a fundamental part of the program from its beginning. PE4Life data has shown marked improvements in student fitness scores, as well as improved academic performance and reductions in classroom disciplinary problems. In 2001, PE4 Life became a national non-profit organization dedicated to promoting quality PE programs where students learn how to develop and sustain a healthy, physically active lifestyle. The PE4Life Academy in Kansas City has trained 189 teams of physical educators and school administrators to develop the program in their own districts, impacting 2,309 schools. PE4Life is one example of an HRPE model that includes both fitness and sport activities.

Lake Park Illinois High School's (53) physical education program is devoted to "aid students in achieving their fullest potential through the acquisition of knowledge and skills necessary to attain healthy levels of well-being and to maintain active lifestyles throughout the lifespan." 9th and 10th grade students take PE one semester and health education one semester, where they learn about their own levels of fitness through an extensive assessment and then plan for improvement and maintenance programs based on their evaluations. In the 11th and 12th grades, students choose from among semester-long courses that include cross-training, aerobic wellness, strength training, dance, team activities and personal wellness. Facilities include a life laboratory, weight room, cardio-fitness center, dance room, and a strength-training center. This HRPE model focuses exclusively on fitness activities that are increasingly available to adults in community and private facilities.

Students in the Spokane School District experience a K-10 PE program (54) focus on healthy lifestyles. Students study a healthy-lifestyles curriculum and live it in their classes through taking part in age-appropriate non-competitive games and activities, fitness activities, and lessons on health and active living. Use of heart rate monitors, pedometers, and computer tracking of progress contribute to student interest and serve as form of assessment and accountability for teachers. Students learn age appropriate skills and activities for developing and maintaining muscular strength and endurance, cardiovascular capacity, flexibility, and body composition. Pop music frequently accompanies class activities.

It would be useful if these innovative programs could be examined by independent researchers so as to assess the efficacy of the programs, in terms of what students do in the program, the level of enjoyment experienced by the students, and outcomes related to healthy lifestyles. It is clear that classroom and physical education teachers who work in school districts that develop comprehensive HRPE programs, such as the ones described above, are expected to teach toward specific goals in ways that contribute to the overall healthy lifestyle outcomes defined by the program.

For school PE/PA to be successful in meeting national goals, PE teachers must be prepared with the knowledge and experiences that enable them to develop and sustain high-quality programs. An innovative teacher-training model to accomplish these goals has been proposed at the University of West Virginia (55). The Sport, Physical Activity, and Fitness Education Specialist major program requires students to obtain competencies in areas such as group and aquatic aerobics, strength conditioning, yoga for fitness, Pilates, cycling/spinning, and various forms of dance, as well as in more traditional sport areas. Students are prepared to teach PE classes, develop staff fitness programs, help to establish and sustain school-based PA programs, and work with community leaders to develop and deliver after-school, weekend, and summer PA programs.

Research Priorities

The following are priorities for research to extend our understanding of how well school programs are delivering and promoting PA and how PA programs in schools influence students to become and stay physically active in discretionary time.

1. Some school PE models, such as SPARK PE, have been disseminated by commercial providers and are competing for adoption at state and district levels. Research is needed to assess the fidelity of implementation and outcomes for commercial PE programs adopted at state or school district levels.
2. Research is needed for the outcomes achieved (both activity outcomes and lifestyle influence outcomes) by middle school and high school PE programs that have moved towards a HRPE model and especially those that have developed a “fitness club” model.
3. Several states and many districts within states require fitness testing yearly, with some states reporting outcomes to parents. Research is needed to assess the degree to which state or district requirements for fitness testing are implemented in the PE curriculum and whether the program preparing students for the test and the testing itself contributes to the achievement of healthy lifestyle goals.
4. Research is needed to assess the degree to which school-based PE/PA programs aim to and are successful in influencing students to become and stay active in discretionary time outside of school.
5. Research is needed to assess the degree to which state and district PE/PA requirements are implemented in local schools and the degree to which programmatic outcomes are being achieved.
6. Research is needed to understand the factors that support the degree to which local school districts implement PA policies and factors that tend to restrict implementation.
7. Research is needed to assess the content and delivery of physical education teacher education (PETE) programs with a special focus on how well prepared first-year teachers are to implement a healthy lifestyles PE program in the schools they serve.

Federal, State, and Local District Roles in the Education Sector

As stated at the outset of this White Paper, the 2001 reauthorization of ESEA as NCLB created a new era of federal involvement in directing the course of education in the states, requiring states to develop standards, to test whether students were meeting the standards, and to designate the level of performance defined as “proficiency.” The 2004 reauthorization of the federal Child Nutrition Act required that all school districts that receive federal support for school breakfast and lunch programs create local school wellness councils that would develop policies to address healthy eating, nutrition education, and physical activity in schools within their district jurisdiction. This act, however, did not require states to develop standards, tests of performance related to those standards, or a level of performance that would be defined as proficient.

Studies have indicated that the overwhelming majority of school districts have adopted wellness policies, as the law requires (56). Many states have passed legislation that serves to guide the development of those district policies. Action for Healthy Kids (57) reported that while 77% of superintendents and 54% of principals felt that their schools were implementing local wellness policies adequately, 70% of school health professionals and physical education teachers disagreed. A more recent report (58) also suggested that tracking of local wellness policy implementation is as important as the development of the policy itself, yet monitoring and evaluation have not been given the attention necessary and in many districts are virtually nonexistent. The National Association of State Boards of Education (59) reported that while the Child Nutrition Reauthorization Act suggested that states should ensure that districts have developed wellness policies, the Act did not include any mention that states are responsible to ensure that policy requirements are met, assess policy quality, assist districts with policy development, or monitor policy implementation. Local level monitoring and evaluation of wellness policy implementation is unlikely to happen unless it is required in state legislation that clearly defines a tracking and evaluation system. The state of California passed significant legislation on physical education as part of their response to the federal requirements for school wellness and has a modest reporting requirement as part of the system. Yet, the California Endowment (60) funded a study that showed that elementary schools were not providing the required number of minutes for PE, that class sizes in many

schools were too large, that the amount of MVPA in classes did not meet state/federal expectations. One might expect that similar results would be found in many other states.

While NCLB required states to develop their standards for English and mathematics, to test whether students met those standards, and to designate the test scores that would define “proficiency,” the law lacked any specificity in terms of the quality or rigor of the standards, tests, or proficiency designation. This led to a substantial degree of variability among the states. In Tennessee, for example, in 2005, 88% of 8th graders met the state’s NCLB “proficient” standard for reading while only 26% reached the “proficient” level for reading on the National Assessment of Educational Progress test (61). Markers for PA should be considerably easier to develop; e.g., whether through process measures such as accumulated steps/week measured by pedometer, MVPA/week, self-reported PA in discretionary time, or an outcome measure such as BMI.

State tracking and accountability systems in education tend to fall into two categories; those that assess compliance with state regulations and those that are results driven by performance on state tests. If results on state tests do not meet expectations, then the reliability of the compliance system is questioned. Many of the wellness policies developed in school districts do not identify specific outcomes with measurable objectives capable of being evaluated. Many do not specify who is responsible for policy implementation. Some policies do not include focus on some of the key elements of school PA policy; for example, 50% of the policies have not included a requirement for recess in elementary schools.

It is difficult to imagine that the Education Sector can play a significant role in the national effort to stem the child/youth obesity crisis and the long-term health costs associated with this crisis unless it takes more seriously the development of high-quality physical activity programs and opportunities throughout the preK-12 system, including physical education, recess, classroom activity breaks, and after-school programming. Students need to be educated about the importance of PA in their lives, to develop the skills necessary to enjoy PA, to have ample opportunities throughout the school day to be physically active, and to have those experiences be so satisfactory that they come to so

value the importance of PA in their lives that they are motivated to be physically active during discretionary time.

To achieve these goals, education policy at the state level has to be considerably more specific in terms of requirements for PE/PA time allocation, curriculum standards that emphasize health-related PE/PA expected outcomes, measurement systems for assessing and reporting those outcomes, sufficient facilities and equipment to enact the programs, and support for continuing professional development for PE and classroom teachers. To achieve this will require a level of funding that goes far beyond what is now typically allocated within districts. To this point, the recent emphasis on local school wellness councils and enhanced PE/PA opportunities has been an unfunded mandate for the vast majority of school districts.

School funding has been a significant issue for many years, primarily due to the number of legal challenges in states following the *Brown vs. the Board of Education* decision. Since 1971, state courts have had to rule on legal challenges to the state education funding formula in 44 of the 50 states (62). The early cases were related to the “equity” of the formula, while the later cases tended to focus on the “adequacy” of the formula. Recently, some states have examined the expenditures for schools or school districts that were meeting standards, using the per pupil costs for those schools as the definition of “adequacy.”

States differ dramatically in terms of the percentage of school funds provided by the state and the percentage raised at the district level (63). Twenty-one states provide at least 50% of school budgets, while more than half the states provide less than 50% with Illinois, South Dakota, and Texas providing the smallest state level funding at around 32%. Hawaii and Vermont contribute close to 90% of district funding. Local districts rely primarily on property tax for school funding, while some have moved to an income tax. Districts that rely on the property tax typically have to put levies on local ballots every several years.

For the Education Sector to achieve the goals suggested in this paper will require a substantial increase in funding at the district level. The Fitness Integrated with Teaching

Kids Act (Fit Kids Act) currently in both houses of the Congress is meant to begin to address the issues raised in this paper. The House Bill (H.R. 3257) is more robust than the Senate version (S.2173). Both versions address amending a series of existing acts to include the promotion of physical education and activity in schools. Both versions fund studies to recommend ways of improving the health of children, to study the impact of health and PA on students' ability to learn, and ways of measuring progress of students in improving their health and well-being and increasing PA. Both versions encourage training for parents on how to encourage their children to be active and eat healthily. The House version requires adding measures of quantity of PE to state accountability systems, measures to include demonstrating progress toward meeting the national goal for required PE of 150 in minutes/week for students in elementary schools and 225 minutes/week for students in middle and high schools and measures of attendance rates in required PE classes. The House version also requires schools to add measures of the quality and quantity of PE on annual report cards and reporting on school space that is used primarily for PE and PA and whether schools have a health council. The House version also would fund PA and PE Assessment Incentive Grants awarded to states to develop, pilot and implement high-quality, valid and reliable assessments that measure knowledge gain in PE, cognitive development in PA skills and how much students value PA as part of a comprehensive plan to improve the overall health and well being of children.

Neither version of the Fit Kids Act suggests any funding for states or local districts to implement the actions defined in the legislation. As such, if passed, it will become another unfunded mandate, the major costs of which will likely be borne by states, with the primary financial burden shifted to local districts.

Recommendations

1. PreK-3 physical education programs should focus primarily on skill themes that allow children to develop self-efficacy in the full range of movement skills while engaging in playful games/activities that have a high enjoyment factor and provide adequate daily PA.
2. Middle and high schools should consider moving towards a Health-Related-Physical Education curriculum that ensures adequate amounts of MVPA, has a high fun quotient,

and works towards influencing students to increase PA in discretionary time. High school PE programs should provide students with choices among attractive sport, fitness and healthy-lifestyle activity courses.

3. The preservice preparation for elementary classroom teachers should include information and training for providing appropriate kinds and amounts of PA/MVPA for children during recess and classroom activity breaks.

4. Elementary classroom teachers should be provided with inservice education to learn how to provide classroom activity breaks that contribute to daily MVPA and enhance behavioral and learning outcomes. Teachers should be provided the equipment and technical support to implement CABs.

5. States should require adequate daily time for recess in elementary schools, with their playgrounds and other facilities organized so as to attract students to engage in activities that provide enjoyable MVPA.

6. States should adopt binding time requirements for PE at elementary, middle, and high school levels, create surveillance systems to monitor district compliance in meeting those requirements, and provide funding that allows local districts to meet those requirements using certified PE teachers.

7. States, working with their local districts, should ensure that preservice teacher education in PE and inservice education for certified PE teachers focus on evidence-based approaches to improving the quality and amount of PA/MVPA/VPA in classes through activities that provide appropriate amounts of MVPA and are designed to be so enjoyable that they contribute to students valuing a physically active lifestyle.

8. States should define the primary health-related outcomes expected from students participating in PE programs, a series of options for measuring performance related to those outcomes at various grade levels, and a system for districts to report outcomes that can be used to establish a state data bank.

9. States should develop surveillance systems to ensure that districts comply with state regulations and outcome reporting systems that enable district and state leadership to assess progress towards district and state and goals. States should require and fund continuing professional development in key areas where goals are not fully met, and work with districts to address the funding issues needed to support a successful outcome for the students.

10. States should adopt the CDC's Comprehensive School Health Program and districts should employ an appropriately trained professional to oversee district development of the CSHP and monitor progress towards district goals.

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