

Promoting Physical Activity in K-12 Schools

Recommendations to K-12 School Boards and Districts to
increase their students' moderate to vigorous physical activity
during school to reduce and prevent childhood obesity.

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PROMOTING PHYSICAL ACTIVITY IN K-12 SCHOOLS

Executive Summary

With almost a third of children and adolescents being overweight or at risk of overweight, few people would deny that childhood obesity is a serious problem. This is a recent phenomenon; the prevalence of overweight preschoolers ages 2 to 5 has doubled from five percent in 1971-1974 to 10.3% in 2003-2004; the prevalence in children ages 6-11 increased 470% in the same period from 4% to 18.8%.

During the same period, the prevalence in adolescents, ages 12 to 19 increased by 279%.¹ Currently, there is no consensus regarding what needs to be done to halt this trend or who needs to do it. Most advocates agree that K-12 schools are in a unique position to affect student health given that most children spend most of their waking hours in school and eat at least one meal in school each day. While there are many factors that contribute to childhood obesity, this report will focus on recommendations to districts and schools to improve students' physical activity during the school day.

The major cause of childhood obesity is an "energy gap," an imbalance between calories consumed and calories required to support normal growth, physical activity, and body functions.² On average, U.S. youth consume about 110-165 more calories each day than needed to support their normal growth and physical activity. This excess consumption over ten years results in 9.5 pounds of excess body weight per child.³

The National Association for Sport and Physical Education (NASPE) recommends that youth engage in moderate to vigorous physical activity (MVPA) for at least 60 minutes a day five times a week. The Centers for Disease Control and Prevention (CDC) define MVPA as activity that requires the body to use 3-6 standard metabolic equivalents (MET). 1 MET is the energy (oxygen) the body uses to sit quietly, read a book, or speak on the phone.⁴ The body requires 3 METs during exercise with very light effort on a stationary bicycle and expends about 136 calories in 60 minutes. The body uses 6 METs during a jazzercise class and expends 340 calories in 60 minutes.⁵ In a 2006 survey, only

¹ Ogden CL, Flegal KM, Carroll MD, et al. "Prevalence and trends in overweight among US children and adolescents, 1999-2000." *Journal of the American Medical Association*, 288(14), 1728-1732: 2002; Hedley AA, Ogden CL, Johnson CL, et al. "Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002." *Journal of the American Medical Association*, 291(23), 2847-2850: 2004.; Ogden CL, Carroll MD, Curtin LR, et al. "Prevalence of overweight and obesity in the United States, 1999-2004." *Journal of the American Medical Association*, 295(13), 1549-1555: 2006.

² Wang Y, Gortmaker G, Sobol A, et al. "Estimating the energy gap among U.S. children: A counterfactual approach." *Pediatrics*, 118(6): 2006.

³ Id.

⁴ U.S. Centers for Disease Control and Prevention. *Physical activity for everyone: Glossary of terms*. Available at: <http://www.cdc.gov/nccdphp/dnpa/physical/everyone/glossary/index.htm>.

⁵ The Compendium of Physical Activities Tracking Guide. Available at: http://prevention.sph.sc.edu/tools/docs/documents_compendium.pdf; CalorieLab. Available at: <http://calorielab.com/burned/?mo=se&gr=02&ti=conditioning+exercise&q=&wt=150&un=lb&kg=68>

34.7% of youth met this recommended level of 60 minutes a day of MVPA.⁶ The Institute of Medicine recommends that schools provide students with 30 minutes of the daily recommended 60 minutes.⁷

In 2006, the CDC found that only 3.8% of elementary schools, 7.9% of middle schools, and 2.1% of high schools provided at least 60 minutes a day five days a week of physical activity.⁸ Furthermore, even students who did engage in physical activity for these times often spent very little of that time engaged in MVPA, which is necessary to achieve the intended health benefits.⁹ Only 53.6% of students attended a physical education class at least once per week during the school year.¹⁰

The childhood obesity epidemic not only impacts students' health, but also their academic performance. Children and adolescents who are overweight and obese often have difficulty in school. Numerous studies have shown a positive correlation between physical activity (PA) and factors contributing to academic performance, such as concentration, memory, and classroom behavior, even when there is a reallocation of school hours from traditional academic classes to physical education.¹¹ There are two main types of physical activity programs, those that are integrated into classroom curriculum and those that focus on changing the nature of physical education class.

⁶ U.S. Centers for Disease Control and Prevention. *National Youth Risk Behavior Survey 2006*. Available at: http://www.cdc.gov/HealthyYouth/yrbs/pdf/yrbs07_us_physical_activity_trend.pdf.

⁷ Koplan JP, Liverman CT, Kraak VI, Eds. *Preventing Childhood Obesity: Health in the Balance*. Washington, DC: National Academies Press, 2004.

⁸ U.S. Centers for Disease Control and Prevention. *School Health Policies and Programs Study 2006*. Available at: <http://www.cdc.gov/HealthyYouth/shpps/index.htm>; Winterfeld A. "PE makes a comeback." State Legislators, 2007.

⁹ Nader, PR. "Frequency and intensity of activity of third-grade children in physical education." *Archives of Pediatric and Adolescent Medicine*, 157(2), 185-190: 2003.; Simons-Morton BG, Taylor WC, Snider SA, et al. "Observed levels of elementary and middle school children's physical activity during physical education classes." *Preventive Medicine*, 23, 437-441: 1994.

¹⁰ U.S. Centers for Disease Control and Prevention. *National Youth Risk Behavior Survey 2006*. Available at: http://www.cdc.gov/HealthyYouth/yrbs/pdf/yrbs07_us_physical_activity_trend.pdf.

¹¹ Trudeau F and Shepard R. "Physical education, school physical activity, school sports and academic performance." *International Journal of Behavioral Nutrition and Physical Activity*. 5(10): 2008.; A study of 546 elementary school students found that the experimental group that had five hours of PE a week versus the control that had 40 minutes per week had improved academic performance, despite spending an average of 14% less in academic classes. Shephard RJ: Curricular physical activity and academic performance. *Pediatric Exercise Science*, 9, 113-126.: 1997.; The same was found in a study of 500 students in South Australia whose math and reading scores were not negatively affected by a reallocation of 1.25 hours per day from academic curricular time to PE. After two years, the researchers followed up with 216 of the original 500 students and found lasting positive effects on their test scores. The reallocation of class time from academic subjects to physical education was also correlated with improved classroom behavior. Ahamed Y, Macdonald H, Reed K, et al. "School-based physical activity does not compromise children's academic performance." *Medicine & Science in Sports & Exercise*, 39, 371-376: 2007.; Results from a cross-sectional survey of 9,000 children ages 7 to 15 demonstrated a significant, positive relationship between academic achievement and physical activity. Pate RR, Heath GW, Dowda M, et al. "Associations between physical activity and other health behaviors in a representative sample of US adolescents." *American Journal of Public Health*, 86(11),1577-1581: 1996. ; A similar study that controlled for socioeconomic status also found a positive correlation between participation in sports and academic achievement. Williams A. "Physical activity patterns among adolescents – some curriculum implications." *Physical Education Review*, 11, 28-39: 1998.

Districts and schools can adopt entire programs or certain aspects of a variety of programs to create a physical education program of their own that best meets their students' needs. What is essential for all districts and schools to do in order to make a significant, lasting effect on reducing and preventing childhood obesity is:

1. Set Measurable Goals
2. Assess the Current Situation
3. Take Action
4. Measure Progress toward Goals

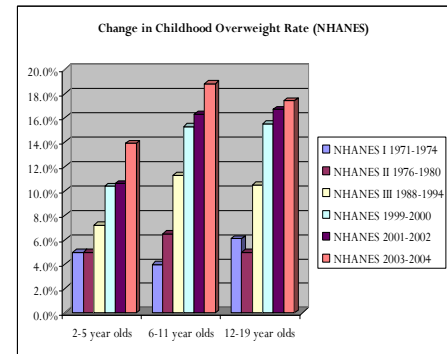
In order for districts and schools to determine which program is best for them, they need to assess the needs of their schools and students. Then, they must establish goals that can be measured as the program is implemented to assess whether the program is working and how it can be improved, continually assessing their progress. These goals can be for community members and school staff as well as students.

The implementation of the program is obviously important, but it is essential that schools are realistic about what a program can achieve in a short period of time and to support those implementing it. One of the most important aspects of whether either type of program succeeds in achieving its goals is initial and ongoing training for teachers. As the program becomes a regular part of the school, schools need to continually revisit their goals and measure the extent to which they are being achieved.

The following report outlines considerations and various approaches that schools and districts can take, but the key is for schools and districts to examine their own unique characteristics and engage in a fluid process of developing what is best for their students.

Part I: The Childhood Obesity Crisis¹²

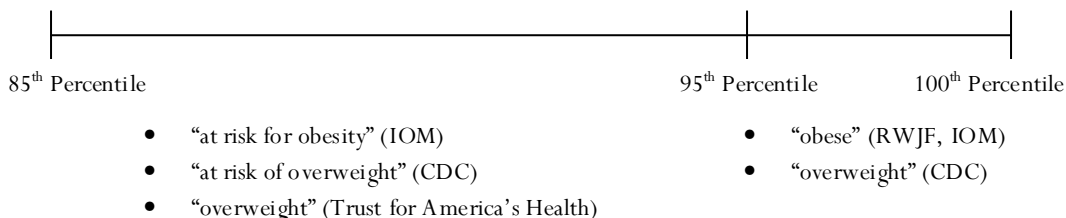
Almost a third (31.0%) of children and adolescents, 6-19 years old, are overweight or at risk of overweight.¹³ This is a recent phenomenon; the prevalence of overweight preschoolers ages 2 to 5 has doubled from five percent in 1971-1974 to 10.3% in 2003-2004; the prevalence in children ages 6-11 increased 470% in the same period from 4% to 18.8%. During the same period, the prevalence in adolescents, ages 12 to 19 increased by 279%.¹⁴



¹² There is no universally approved definition of “obesity” for children, in part because medical experts have not settled on a single method to measure obesity or a cutoff point for excess fatness or overweight. Various methods used in the clinical environment include: Body Mass Index (BMI) calculation, skin fold thickness, and waist circumference. Dehghan, M., Akhtar-Danesh, N., & Merchant, A. (2005). Childhood obesity, prevalence and prevention. *Nutrition Journal*. 4:24. Available at: <http://www.nutritionj.com/content/4/1/24>.; Cole TJ, Bellizzi MC, Flegal KM, Dietz WH (2000, May 6). (For a comparison of measurement methods in Brazil, Great Britain, Hong Kong, the Netherlands, Singapore, and the United States, see Establishing a standard definition for child overweight and obesity worldwide: international survey. *British Medical Journal* 320(7244). Available at: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=27365>.

The CDC uses body mass index (BMI), to categorize a youth as underweight, overweight, or at risk for overweight. BMI is an indirect measure of body fat calculated as the ratio of a person’s body weight in kilograms to the square of the person’s height in meters. The Robert Wood Johnson Foundation (RWJF) and the Institute of Medicine (IOM) use this same measurement for obesity. BMI is based on growth charts for age and gender and is often referred to as “BMI-for-age.” According to the CDC, a child with a BMI-for age that is equal to or greater than the 95th percentile is considered overweight and a child with a BMI-for-age that is greater between the 85th and 95th percentile is considered at risk of overweight., US Centers for Disease Control and Prevention. Division of Nutrition and Physical Activity. Defining Obesity and Overweight. Available at <http://www.cdc.gov/nccdphp/dnpa/obesity/defining.htm>.

Though the most common method of measurement in the United States is BMI, government agencies, foundations, and researchers often use different terms to describe obesity and overweight in children and adolescents. RWJF and IOM use the term “obese” for children and adolescents who have a body mass index (BMI) at or above the 95th percentile for their gender and age. IOM uses the term “at risk for obesity” to describe those with BMI at or above the 85th percentile but below the 95th. The CDC uses the term “overweight” for those at or above the 95th percentile and “at risk of overweight” for children and adolescents at or above the 85th percentile but below the 95th percentile. The Trust for America’s Health uses the term “overweight” for children and adolescents with a BMI at or above the 85th percentile but below the 95th.; Trust for America’s Health. *F as in Fat: How obesity policies are failing in America*. 2007. Available at: <http://healthyamericans.org/reports/obesity2007/Obesity2007Report.pdf>. For purposes of this paper, the CDC definition will be used if not otherwise specified.



¹³Hedley AA, Ogden CL, Johnson CL, et al. “Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002.” *Journal of the American Medical Association*, 291(23),2847-2850: 2004.

Energy Gap¹⁵

The major cause of childhood obesity is an “energy gap,” an imbalance between calories consumed and calories required to support normal growth, physical activity, and body functions.¹⁶ On average, U.S. youth consume about 110-165 more calories each day than needed to support their normal growth and physical activity. This excess consumption over ten years results in 9.5 pounds of excess body weight per child.¹⁷

Excessive Caloric Intake and Poor Nutrition

The energy gap is partially caused by the excessive consumption of calories. From 1977 to 1994, caloric consumption increased dramatically, by 9% in adolescent boys and 7% in adolescent girls.¹⁸

One cause of this increase is the increase in portion size. From 1977 to 1996, the average portions of salty snacks consumed by children increased from 132 to 225 calories, soft drinks from 144 to 193 calories, and hamburgers from 389 to 486 calories.¹⁹

A second cause of this increase is children’s increased consumption of food outside of home, including fast food. Controlling for socioeconomic and demographic factors, a national household survey found that children who eat fast food on a given day consume more calories, fat, carbohydrates, added sugars,

¹⁴ Ogden CL, Flegal KM, Carroll MD, et al. “Prevalence and trends in overweight among US children and adolescents, 1999-2000.” *Journal of the American Medical Association*, 288(14), 1728-1732: 2002; Hedley AA, Ogden CL, Johnson CL, et al. “Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002.” *Journal of the American Medical Association*, 291(23), 2847-2850: 2004.; Ogden CL, Carroll MD, Curtin LR, et al. “Prevalence of overweight and obesity in the United States, 1999-2004.” *Journal of the American Medical Association*, 295(13), 1549-1555: 2006.

¹⁵ Genetics alone can not account for the rapid increase in childhood obesity. The human genetic makeup has not changed in the last two decades, while childhood obesity has more than doubled. Institute of Medicine. *Childhood Obesity in the United States: Facts and figures*. From: Koplan JP, Liverman CT, Kraak VI, Eds. *Preventing Childhood Obesity: Health in the Balance*. Washington, DC: National Academies Press, 2005.; “Serious doubts have been raised in many quarters” concerning the heritability of obesity. While there is an increased prevalence of obesity in families of obese individuals, this may be attributed to lifestyle rather than genetics as spouses of obese individuals also have an increased propensity for developing the disease. In people who have a genetic predisposition to obesity, the severity of the disease is mostly determined by lifestyle and environment, enabling those with such a disposition to prevent obesity. The literature suggests that genetic obesity is confined to the severely obese, which accounts for a small percentage of overall obesity cases. Thus, most obesity cases are the results of maladaptation to one’s environment rather than a genetic predisposition. Loos RJF and Bouchard C. “Obesity – is it a genetic disorder?” *Journal of Internal Medicine*, 254, 401-425: 2003.

¹⁶ Wang Y, Gortmaker G, Sobol A, et al. “Estimating the energy gap among U.S. children: A counterfactual approach.” *Pediatrics*, 118(6): 2006.

¹⁷ Id.

¹⁸ Enns CW, Mickle SJ and Goldman JD. “Trends in food and nutrient intakes by adolescents in the United States.” *Family Economics and Nutrition Review*, 15(2), 15–27: 2003.

¹⁹ Nielsen SJ and Popkin BM. “Patterns and trends in food portion sizes, 1977-1998.” *Journal of the American Medical Association*, 289, 450-453: 2003.

and sugar-sweetened beverages, and less fiber, milk, fruit, and non-starchy vegetables than children who have not eaten fast food that day.²⁰

A third cause is children's increased consumption of sweetened beverages. Soda and fruit juice have high sugar content and therefore high calorie content with little nutritional value. A survey using nationally representative data on youth food intake found that 32% of young females and 52% of young men consume three or more servings of soda a day.²¹ Daily consumption of fruit juice nearly doubled for girls 12-19 and more than doubled for boys 12-19 from 1977-78 to 1994-96.²²

A fourth cause is the availability at school of high calorie foods and beverages that have low nutritional value. The food provided to eight million children at breakfast and 28 million at lunch through the National School Lunch and Breakfast Programs is subject to the USDA's Dietary Guidelines.²³ Many schools, however, also sell food in snack bars and vending machines. A 2000 study found that 74% of middle/junior high schools and 98% of high schools have vending machines, schools stores, or snack bars.²⁴ These foods are not subject to those standards and are usually high in calories and low in nutritional value.²⁵ A 2003 survey found that in middle and high schools, 75% of vending machine beverage options and 85% of snacks were of poor nutritional quality.²⁶

Lastly, America's children do not eat the recommended amounts of healthy foods. The substitution of healthy foods with higher calorie processed foods contributes to the childhood obesity epidemic. Almost 80% of high school students do not consume the daily recommended five servings of fruits and vegetables.²⁷ Fewer than 40% of children and adolescents in the United States meet saturated fat or fiber (found in foods like fruit, vegetables, and whole grains) dietary guidelines.²⁸

²⁰ Bowman SA, Gortmaker SL, Ebbeling CB, et al. "Effects of fast-food consumption on energy intake and diet quality among children in a national household survey." *Pediatrics*, 113(1),112-118: 2004.

²¹ Gleason P and Sutor C. *Children's diets in the mid-1990s: dietary intake and its relationship with school meal participation*. Alexandria,VA: US Department of Agriculture, 2001. Report #CN-01- CD1.

²² Enns CW, Mickle SJ and Goldman JD. "Trends in food and nutrient intakes by adolescents in the United States." *Family Economics and Nutrition Review*, 15(2), 15-27: 2003.

²³ Institute of Medicine. Fact Sheet: Schools can play a role in preventing childhood obesity. From: Koplan JP, Liverman CT, Kraak VI, Eds. *Preventing Childhood Obesity: Health in the Balance*. Washington, DC: National Academies Press, 2005.

²⁴ U.S. Centers for Disease Control and Prevention (CDC). *School Health Policies and Programs Study 2000*. Available at: http://www.cdc.gov/nccdphp/dash/shpps/factsheets/fs00_ns.htm.

²⁵ U.S. Department of Health and Human Services. *Healthy People 2010: Objectives for Improving Health*. Washington, DC: U.S. Government Printing Office, 2000.

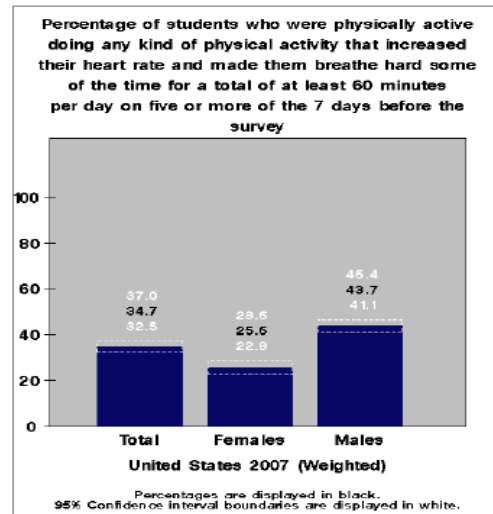
²⁶ Center for Science in the Public Interest. *Dispensing junk: How school vending undermines efforts to feed children well*. Washington, DC, May 2004. Available at: http://cspinet.org/new/pdf/dispensing_junk.pdf.

²⁷ U.S. Centers for Disease Control and Prevention. *Youth Risk Behavior Surveillance - United States, 2005*. Morbidity & Mortality Weekly Report, 55(SS-5), 1-108: 2006. Available at: <http://www.cdc.gov/mmwr/PDF/SS/SS5505.pdf>.

²⁸ U.S. Department of Agriculture. "Continuing Survey of Food Intakes by Individuals 1994-96." 1998.; Lin BH, Guthrie J and Frazao E. "American children's diets not making the grade." *Food Review*, 24(2), 8-17, 2001.

Insufficient Physical Activity throughout the Day

Along with excessive caloric consumption, the energy gap is caused by children not engaging in sufficient physical activity. The Surgeon General recommends that children engage in a minimum of 60 minutes a day of aerobic physical activity to maintain a healthy body weight and 90 minutes to lose weight.²⁹ NASPE recommends that youth engage in MVPA for at least 60 minutes a day five times a week. The CDC defines MVPA as activity that requires the body to use 3-6 METs. 1 MET is the energy (oxygen) the body uses to sit quietly, read a book, or speak on the phone.³⁰ The body requires 3 METs during exercise with very light effort on a stationary bicycle and expends about 136 calories in 60 minutes. The body uses 6 METs during a jazzercise class and expends 340 calories in 60 minutes.³¹ In a 2006 survey, only 34.7% of youth met this recommended level of 60 minutes a day of MVPA.³² The Institute of Medicine recommends that schools provide students with 30 minutes of the daily recommended 60 minutes.³³



SOURCE: YOUTH RISK BEHAVIOR SURVEILLANCE SYSTEM, 2007 PHYSICAL ACTIVITY SURVEY RESULTS

Insufficient Physical Activity in School

Children are particularly failing to get sufficient physical activity at school. NASPE recommends that elementary school students participate in 150 minutes of physical education a week and middle and high school students participate in 225 minutes per week.³⁴ In 2006, the CDC found that only 3.8% of elementary schools, 7.9% of middle schools, and 2.1% of high schools provided this amount of physical

²⁹ U.S. Centers for Disease Control and Prevention. *Physical activity for everyone: Are there special recommendations for young people?* 2007. Available at: <http://www.cdc.gov/nccdphp/dnpa/physical/recommendations/young.htm>; Department of Health and Human Services. Childhood Overweight and Obesity Prevention Initiative. *Healthy Youth for a Healthy Future*. Available at: <http://www.surgeongeneral.gov/obesityprevention/factsheet/>.

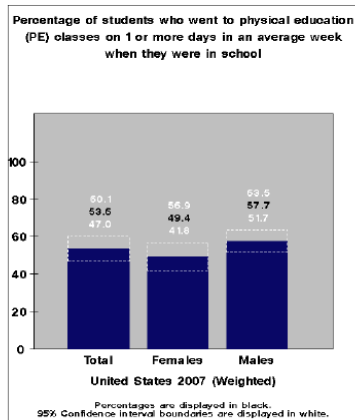
³⁰ U.S. Centers for Disease Control and Prevention. *Physical activity for everyone: Glossary of terms*. Available at: <http://www.cdc.gov/nccdphp/dnpa/physical/everyone/glossary/index.htm>.

³¹ The Compendium of Physical Activities Tracking Guide. Available at: http://prevention.sph.sc.edu/tools/docs/documents_compendium.pdf; CalorieLab. Available at: <http://calorielab.com/burned/?mo=se&gr=02&ti=conditioning+exercise&q=&wt=150&un=lb&kg=68>

³² U.S. Centers for Disease Control and Prevention. *National Youth Risk Behavior Survey 2006*. Available at: http://www.cdc.gov/HealthyYouth/yrbs/pdf/yrbs07_us_physical_activity_trend.pdf.

³³ Koplan JP, Liverman CT, Kraak VI, Eds. *Preventing Childhood Obesity: Health in the Balance*. Washington, DC: National Academies Press, 2004.

³⁴ Winterfeld A. "PE makes a comeback." State Legislators, 2007.

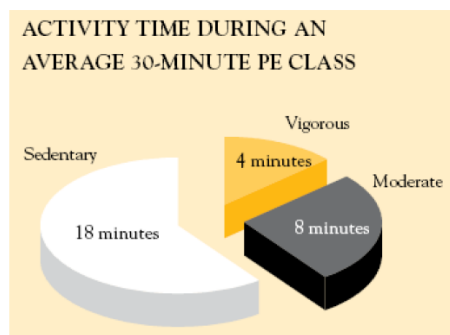


SOURCE: YOUTH RISK BEHAVIOR SURVEILLANCE SYSTEM, 2007 PHYSICAL ACTIVITY SURVEY RESULTS

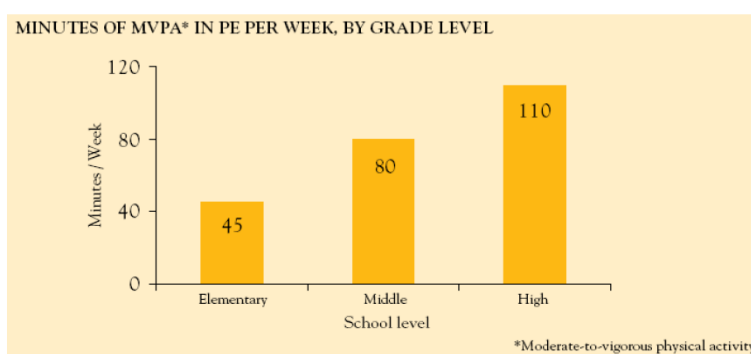
education.³⁵ Only 53.6% of students attended a physical education class at least once per week during the school year.³⁶ Furthermore, even students who did meet these time levels often spent very little of that time engaged in MVPA, which is necessary to achieve the intended health benefits.³⁷

In addition to not having enough time in physical education class, not enough of the time in class is spent in MVPA. The Healthy People 2010 recommendation is that 50% of physical education time should be spent engaging in MVPA; 75 minutes of MVPA in elementary school and 112.5 minutes in middle and high school.³⁸

A 2007 California Endowment study that examined the state of physical activity and education in 77 California schools found that most schools are far from reaching these goals.

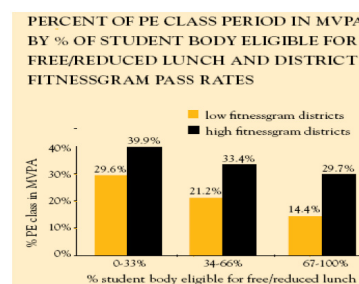


SOURCE: THE CALIFORNIA ENDOWMENT. *FAILING FITNESS: PHYSICAL ACTIVITY AND PHYSICAL EDUCATION IN SCHOOLS. ACTIVITY MATTERS FOR CALIFORNIA KIDS POLICY BRIEF. JANUARY 2007.*



SOURCE: THE CALIFORNIA ENDOWMENT. *FAILING FITNESS: PHYSICAL ACTIVITY AND PHYSICAL EDUCATION IN SCHOOLS. ACTIVITY MATTERS FOR CALIFORNIA KIDS POLICY BRIEF. JANUARY 2007.*

The districts that are reaching these goals are higher income districts with smaller physical education class sizes.³⁹ Students in higher income California schools spend 20% more time in physical education in MVPA than those in low-income schools.⁴⁰ This trend is likely to exist in other states as well. This difference makes it



SOURCE: THE CALIFORNIA ENDOWMENT. *FAILING FITNESS: PHYSICAL ACTIVITY AND PHYSICAL EDUCATION IN SCHOOLS. ACTIVITY MATTERS FOR CALIFORNIA KIDS POLICY BRIEF. JANUARY 2007.*

³⁵ U.S. Centers for Disease Control and Prevention. *School Health Policies and Programs Study 2006*. Available at: <http://www.cdc.gov/HealthyYouth/shpps/index.htm>.

³⁶ U.S. Centers for Disease Control and Prevention. *National Youth Risk Behavior Survey 2006*. Available at: http://www.cdc.gov/HealthyYouth/yrbs/pdf/yrbs07_us_physical_activity_trend.pdf.

³⁷ Nader, PR. "Frequency and intensity of activity of third-grade children in physical education." *Archives of Pediatric and Adolescent Medicine*, 157(2), 185-190: 2003.; Simons-Morton BG, Taylor WC, Snider SA, et al. "Observed levels of elementary and middle school children's physical activity during physical education classes." *Preventive Medicine*, 23, 437-441: 1994.

³⁸ The California Endowment. *Failing fitness: Physical activity and physical education in schools*. Activity Matters for California Kids Policy Brief. January 2007.

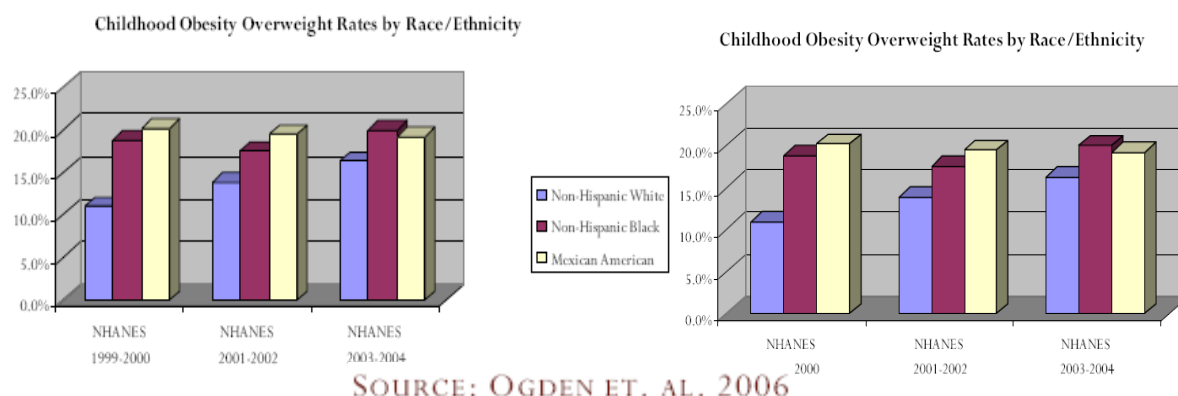
³⁹ Id.

⁴⁰ Id.

particularly important to focus on increasing the physical activity levels of students in lower income districts.

Racial Disparities in the Impact of Childhood Obesity⁴¹

While the obesity epidemic is affecting almost a third of all children in the United States, it is disproportionately impacting populations of color.



In particular, Mexican American males and African-American females have high rates of childhood overweight and obesity. There are many potential causes for this disparity, but there is no clear evidence as to a precise reason. It is clear, though, that this prevalence is not related to family income.⁴² What also is clear is that obesity does not impact people of all racial and ethnic backgrounds uniformly. 42.8% of Mexican American males 6-19 years old are at risk of overweight or overweight, compared to 31.0% of non-Hispanic African Americans and 29.2% of non-Hispanics whites.⁴³ 40.1% of non-Hispanic African American females are at risk of overweight or overweight, compared to 36.6% of Mexican American females and 27.0% of non-Hispanic white females.⁴⁴

⁴¹ Maturation patterns differ between different ethnic groups. Dehghan M, Akhtar-Danesh N and Merchant A. "Childhood obesity, prevalence and prevention." *Nutrition Journal*, 4, 24: 2005. Available at: <http://www.nutritionj.com/content/4/1/24>. Consequently, using BMI-for-age as the basis for categorizing youth and adolescents as overweight and at risk of overweight may have a disproportionate impact on some groups. For example, females in ethnic groups that mature earlier than average may appear to have more of an obesity problem if one looks at an age range during which that ethnic group has matured, but other groups have not. This is, however, not a well documented concern and certainly does not account for all of the disproportionate impact of childhood obesity among particular populations.

⁴² Troiano RP and Flegal KM. "Overweight children and adolescents: description, epidemiology, and demographics." *Pediatrics*, 101, 497-504: 1998.

⁴³ There is limited data for other Hispanic groups.; Hedley AA, Ogden CL, Johnson CL, et al. "Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002." *Journal of the American Medical Association*, 291(23), 2847-2850: 2004.; Ogden CL, Carroll MD, Curtin LR, et al. "Prevalence of overweight and obesity in the United States, 1999-2004." *Journal of the American Medical Association*, 295(13), 1549-1555: 2006.

⁴⁴ Hedley AA, Ogden CL, Johnson CL, et al. "Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002." *Journal of the American Medical Association*, 291(23), 2847-2850: 2004.

Scope of Paper

Ideally, obesity interventions are comprehensive and integrated.⁴⁵ Obesity interventions can include changing school food and health services, improving health education, including nutrition classes, counseling, decreasing sedentary behavior, and developing faculty and staff wellness programs. Several studies have shown that a multi-faceted approach is most effective, although more research needs to be done to determine which factors contribute to whether particular combinations of interventions are most effective. This paper will limit its focus to recommending best practices for increasing physical activity in K-12 schools because physical activity interventions have been found to have a high efficacy in reducing obesity related measures.⁴⁶

⁴⁵ The authors of the Community Preventive Services Task Force review and American Dietetic Association review concluded that school-based obesity interventions should be multi-component and address nutrition, physical activity, and sedentary behaviors. Peterson KE and Fox MK. “Addressing the epidemic of childhood obesity through school-based interventions: What has been done and where do we go from here?” *Journal of Law, Medicine & Ethics*, 35, 113-130: Spring 2007.

⁴⁶ Shaya FT, Flores D, Gbarayor CM, et al. “School-based obesity interventions: A literature review.” *Journal of School Health*, 78(4), 189-198: 2008.

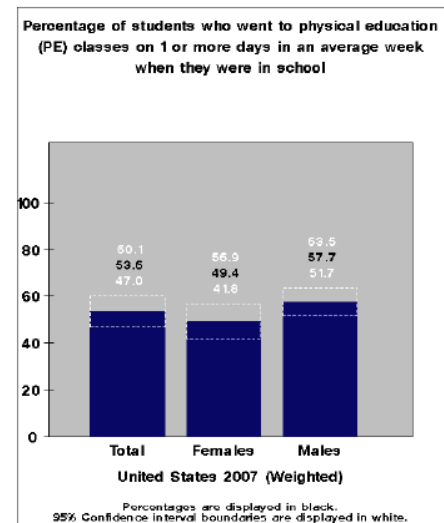
Part II: Needs and Resource Assessment

The Lack of Adequate Physical Education in K-12 Schools

Reduction in Physical Education Time

A number of factors have caused schools to provide an inadequate amount and quality of physical activity. First, in the last decade, faced with drastic budget cuts and penalties for missing standardized test score targets, schools have reduced opportunities for youth to be physically active by shortening or eliminating recess, physical activity classes, and intramural and extracurricular sport activities.⁴⁷

As noted earlier, NASPE recommends that elementary school students participate in 150 minutes of physical education a week and middle and high school students participate in 225 minutes per week.⁴⁸ In 2006, the CDC found that only 3.8% of elementary schools, 7.9% of middle schools, and 2.1% of high schools provided this amount of physical education.⁴⁹ Only 53.6% of students attended a physical education class at least once per week during the school year.⁵⁰



SOURCE: YOUTH RISK BEHAVIOR SURVEILLANCE SYSTEM, 2007 PHYSICAL ACTIVITY SURVEY RESULTS

Inadequate School Facilities and Recreational Space

Second, schools no longer have adequate physical education school facilities and recreational community space.

In a 2000 survey, 50% of schools in the U.S. reported that their facilities were inadequate to meet their needs, as defined by those schools.⁵¹ The implications of this finding are clear as middle school students have been found to engage in more physical activity with larger school recreation areas.⁵² The lack of

⁴⁷ Burgeson CR, Wechsler H, Brener ND, et al. "Physical education and activity: Results from the School Health Policies and Programs Study. *Journal of School Health*, 71(7), 279-293: 2000.; Heath GW, Pratt M, Warren CW, et al. "Physical activity patterns in high school students." *Archives of Pediatrics and Adolescent Medicine*, 148, 1131-1136: 1994.

⁴⁸ Winterfeld A. "PE makes a comeback." State Legislators, 2007.

⁴⁹ U.S. Centers for Disease Control and Prevention. *School Health Policies and Programs Study 2006*. Available at: <http://www.cdc.gov/HealthyYouth/shpps/index.htm>.

⁵⁰ U.S. Centers for Disease Control and Prevention. *National Youth Risk Behavior Survey 2006*. Available at: http://www.cdc.gov/HealthyYouth/yrbs/pdf/yrbs07_us_physical_activity_trend.pdf.

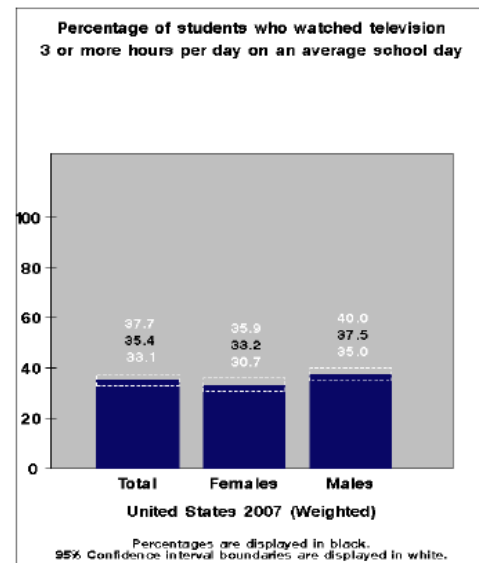
⁵¹ Hardman K, Marshall JJ. "Physical education in schools: Preliminary finding of a worldwide survey part II. *Journal of International Council for Health, Physical Education, Recreation, Sport and Dance*. 36, 8-11: 2000.

⁵² Cradock AL, Melly SJ, Allen JG et al. "Characteristics of school campuses and youth physical activity: Does size matter?" Presented at Activity Living Research Conference. Coronado, CA. February 16-18, 2006.; The California Endowment. *Failing fitness: Physical activity and physical education in schools*. Activity Matters for California Kids Policy Brief. January 2007.

such facilities makes it less likely that students will engage in as much physical activity as they would with more available space.

Over 825,000 or 25% of adolescents in California do not have access to a safe park.⁵³ The numbers are even higher for lower-income, Latino, and African-American teens.⁵⁴

In Los Angeles, only 103 of 605 Los Angeles Unified School District (LAUSD) schools have more than five acres of playing fields and those that do are disproportionately located in wealthy, white neighborhoods. In LAUSD, 71% more play acres are available for non-Hispanic white students than Latino students in elementary school.⁵⁵ There are many reasons for this disparity, including overcrowding that results in play acres being converted into classroom space.



SOURCE: YOUTH RISK BEHAVIOR SURVEILLANCE SYSTEM, 2007 PHYSICAL ACTIVITY SURVEY RESULTS

Increased Time Spent on Sedentary Activities

Third, according to a survey of over 2,000 nationally representative 3rd to 12th graders, the average American child spends 44.5 hours each week using media outside of school.⁵⁶ 31% of the children had their own computers in their rooms used their computers 45 minutes more each day than children who did not have a computer in their room.⁵⁷ 68% of children had a television set in their room, and those children watched an average of 90 minutes more television than those who did not have their own television set.⁵⁸ A 2006 CDC study found that 35.4% of children spend at least three hours a day watching television.⁵⁹ Television viewing and childhood obesity in children as young as preschool is positively correlated.⁶⁰ A 1999 study found that reducing television viewing, controlling for other

⁵³ Babey SH, Diamant AL, Brown R, et al. “California adolescents increasingly inactive.” UCLA Center for Health Policy Research. Health Policy Research Brief. April 2005. Available at: http://www.healthpolicy.ucla.edu/pubs/files/TeensInactive_PB_040105_.pdf.

⁵⁴ Id.

⁵⁵ The City Project. Move More, Eat Well, Stay Healthy in Schools and Parks. Available at: <http://www.cityprojectca.org/ourwork/urbanparks.html#movemoreeatwellparks>.

⁵⁶ *Generation M: Media in the Lives of 8–18 Year Olds*. Menlo Park, Calif.: Kaiser Family Foundation, 2005.

⁵⁷ Id.

⁵⁸ Id.

⁵⁹ U.S. Centers for Disease Control and Prevention. *National Youth Risk Behavior Survey 2006*. Available at: http://www.cdc.gov/HealthyYouth/yrbs/pdf/yrbs07_us_physical_activity_trend.pdf.

⁶⁰ Dennison BA, Erb TA and Jenkins PL. “Television viewing and television in bedroom associated with overweight risk among low-income preschool children.” *Pediatrics*, 109(6), 1028-1035: 2002.

factors influencing obesity, was correlated with a reduction in obesity.⁶¹ This relationship is likely caused by a variety of factors; television viewing often replaces more active pursuits, children often snack on unhealthy foods while watching television, and children are exposed to advertisements for high sugar, high salt, and high fat foods.⁶² Increased time on these sedentary activities contributes to youth's overall lack of MVPA during and outside of school.

Impact on Academic Achievement

The childhood obesity epidemic not only impacts students' health, but also their academic performance. Children and adolescents who are overweight and obese often have difficulty in school. First, childhood obesity is associated with challenges with concentration and memory.⁶³ Second, children experience negative social ramifications, including teasing, low self-esteem, and isolation.

Numerous studies have shown a positive correlation between physical activity (PA) and factors contributing to academic performance, such as concentration, memory, and classroom behavior, even when there is a reallocation of school hours from traditional academic classes to physical education.⁶⁴ These positive outcomes may be explained by a positive association between physical activity and cognitive functioning. Particularly in middle school and younger students, the benefits of physical activity in terms of cognitive functioning are well documented.⁶⁵ The negative association between

⁶¹ Gortmaker SL, Peterson K, Wiecha J et al. "Reducing obesity via a school-based interdisciplinary intervention among youth." *Archives of Pediatrics and Adolescent Medicine*, 153: 409-418, 1999.

⁶² Aktas A. "The effects of television food advertisement on children's food purchasing requests." *Pediatrics International*, 48, 138-145: 2006.; Connor SM. "Food-related advertising on preschool television: Building brand recognition in young viewers." *Pediatrics*, 118, 1478-1485: 2006.

⁶³ Babey SH, Diamant AL, Brown R, et al. "California adolescents increasingly inactive." UCLA Center for Health Policy Research. Health Policy Research Brief. April 2005. Available at: http://www.healthpolicy.ucla.edu/pubs/files/TeensInactive_PB_040105_.pdf.

⁶⁴ Trudeau F and Shepard R. "Physical education, school physical activity, school sports and academic performance." *International Journal of Behavioral Nutrition and Physical Activity*. 5(10): 2008.; A study of 546 elementary school students found that the experimental group that had five hours of PE a week versus the control that had 40 minutes per week had improved academic performance, despite spending an average of 14% less in academic classes. Shephard RJ: Curricular physical activity and academic performance. *Pediatric Exercise Science*, 9, 113-126.: 1997.; The same was found in a study of 500 students in South Australia whose math and reading scores were not negatively affected by a reallocation of 1.25 hours per day from academic curricular time to PE. After two years, the researchers followed up with 216 of the original 500 students and found lasting positive effects on their test scores. The reallocation of class time from academic subjects to physical education was also correlated with improved classroom behavior. Ahamed Y, Macdonald H, Reed K, et al. "School-based physical activity does not compromise children's academic performance." *Medicine & Science in Sports & Exercise*, 39, 371-376: 2007.; Results from a cross-sectional survey of 9,000 children ages 7 to 15 demonstrated a significant, positive relationship between academic achievement and physical activity. Pate RR, Heath GW, Dowda M, et al. "Associations between physical activity and other health behaviors in a representative sample of US adolescents." *American Journal of Public Health*, 86(11),1577-1581: 1996. ; A similar study that controlled for socioeconomic status also found a positive correlation between participation in sports and academic achievement. Williams A. "Physical activity patterns among adolescents – some curriculum implications." *Physical Education Review*, 11, 28-39: 1998.

⁶⁵ Brisswalter J, Collardeau M and Rene A. "Effects of acute physical exercise characteristics on cognitive performance." *Sports Medicine*, 32, 555-566: 2002; Sibley BA and Etnier J. "The relationship between physical activity and cognition in children: A

body mass index (BMI) and cognitive functioning remain significant even after controlling for parental and familial characteristics, sports participation, physical activity, television viewing time, psychosocial development, blood pressure, and serum lipid profiles.⁶⁶ Regardless of these other factors, a child with a high weight-to-height ratio is at risk of lower cognitive functioning. This outcome, however, should not be understood to suggest that these other factors are unimportant as they all do affect an individual's BMI.

The hippocampus is the brain region that mediates memory and learning. When two neurons are stimulated simultaneously, it creates a long-lasting improvement in the neurons' communication, called long-term potentiation (LTP).⁶⁷ LTP is a major cellular mechanism that underlies learning and memory.⁶⁸ Short term memory functions are regulated in the hippocampus, which requires LTP for proper functioning. There is evidence that physical activity positively affects the hippocampus by increasing the formation of new neurons, augmenting LTP, and creating a favorable environment for LTP.⁶⁹

Studies that have not found academic achievement and physical activity to be positively correlated have generally not found a negative correlation either.⁷⁰ Interestingly, decreasing PE time to spend more time in academic subjects did not lead to an increase in performance in those students.⁷¹

Indirect positive effects from physical activity on academic achievement have also been found. Increased participation in school sports or other physical activity programs have been positively linked

meta-analysis." *Pediatric Exercise Science*, 15, 243-256: 2003; Tomporowski PD. "Cognitive and behavioral responses to acute exercise in youths: a review." *Pediatric Exercise Science*, 15, 348-359: 2003.

⁶⁶ Li Y, Dai Q, Jackson JC and Zhang J. "Overweight is associated with decreased cognitive functioning among school-age children and adolescents." *Obesity*, June 12, 2008 (e-published ahead of print).

⁶⁷ Cooke SF and Bliss TV. "Plasticity in the human central nervous system." *Brain* 129(7): 1659-73.

⁶⁸ Id.

⁶⁹ Id.; Kempermann G, van Praag H, Gage FH. "Activity-dependent regulation of neuronal plasticity and self repair." *Progress in Brain Research*, 127, 35-48: 2000.; Van Praag H, Kempermann G, and Gage FH. "Running increases cell proliferation and neurogenesis in the adult mouse dentate gyrus." *Nature Neuroscience*, 2, 203-205: 1999.; Van Praag H and Gage FH. "Genetics of childhood disorders: XXXVI. Stem cell research, part 1: New neurons in the adult brain." *Journal of the American Academy of Child Adolescent Psychiatry*, 41, 354-356: 2002; Anderson BJ, Rapp DN, Baek DH, et al. "Exercise influences spatial learning in the radial arm maze." *Physiology & Behavior*, 70,425-429: 2000; Fordyce DE and Wehner JM. "Physical activity enhances spatial learning performance with an associated alteration in hippocampal protein kinase C activity in C57BL/6 and DBA/2 mice." *Brain Research*, 619, 111-119: 1993.; Dubé M-C, Massicotte G and Trudeau F. "Time course of brain glutamate receptors binding following exercise in rats." *Canadian Journal of Applied Physiology*, 22, 14P: 1997.; Cotman CW and Berchtold NC. "Exercise: a behavioral intervention to enhance brain health and plasticity." *Trends in Neuroscience*, 25, 295-301: 2002.

⁷⁰Trudeau F and Shepard R. "Physical education, school physical activity, school sports and academic performance." *International Journal of Behavioral Nutrition and Physical Activity*. 5(10): 2008.; A study done in Virginia primary schools found that increasing PE time at the expense of academic subjects did not negatively impact test scores in those subjects.

⁷¹ Wilkins JLM, Graham G, Parker S, Westfall S, et al. "Time in the arts and physical education and school achievement." *Journal of Curriculum Studies*, 35, 721-734: 2003.

to school satisfaction, connectedness, emotional well-being, and future expectations, which are all factors in preventing school drop out and improving academic performance.⁷²

It is important to note that at least one study disaggregated the impact of sports and exercise participation by grade point average (GPA) and found a positive impact on GPA for students with the highest GPAs, but a negative correlation for students with the lowest GPAs.⁷³ This means that students that are already performing well in school perform even better academically when they engage in more physical activity, but that for students who are not performing well, engaging in physical activity actually is correlated with diminished academic performance. This finding has particularly important implications in communities with high rates of childhood obesity and lower rates of academic achievement. While it is important to keep this in mind, most research has not found this negative correlation for students with lower GPAs. More research is needed to investigate the impact of reallocating PE time from academic class time for students in groups at high risk of obesity, who are also academically behind.

⁷² Brown R and Evans WP. "Extracurricular activity and ethnicity: creating greater school connection among diverse student populations." *Urban Education*, 37, 41-58: 2002; Libbey HP. "Measuring student relationships to school: attachment, bonding, connectedness, and engagement." *Journal of School Health*, 74, 274-283: 2004.; Nelson MC and Gordon-Larsen P. "Physical activity and sedentary behavior patterns are associated with selected adolescent health risk behaviors." *Pediatrics*, 117,1281-1290: 2006.

⁷³ Lindner KJ. "Sport participation and perceived academic performance of school children and youth." *Pediatric Exercise Science*, 11,129-143: 1999.; Lindner KJ. "The physical activity participation-academic performance relationship revisited: perceived and actual performance and the effect of banding (academic tracking)." *Pediatric Exercise Science*, 14, 155-169: 2002.

Part III: Physical Activity Analysis

Current State of the World

As increasing numbers of people have begun to acknowledge that the childhood obesity epidemic has reached a crisis level, various states, researchers, and physical activity experts have engaged in various ways attempting to systematically increase physical activity for children. The following section reviews innovative state action, existing physical activity programs, and comprehensive analyses of state regulations and enforcement mechanisms that are in progress.

Innovative State Action

Though this report focuses on measures that districts and schools can implement, this section reviews some innovative actions that states have taken. Districts and sometimes schools in other states may choose to implement similar initiatives on their own if their state has not required them to do so.

Physical Activity Assessment

Fitness Testing of Students

In a 2006 CDC study, very few states required schools to test their students for physical education knowledge, skills, or fitness levels, and no state required elementary, middle, and high school students to be tested in all three of these areas. In elementary school, only one state, Missouri, required written tests of fitness knowledge and Hawaii was alone in requiring elementary school students to complete skill performance tests.⁷⁴ Six states required elementary schools to administer fitness level tests: Alabama, California, Connecticut, Missouri, New York, and West Virginia.⁷⁵ In middle school, only one state, Missouri, required written tests of knowledge or skill performance tests. Seven states required fitness level tests in middle school: the same states that require tests in elementary school plus Maine.⁷⁶ Two states required high school students to take written tests of knowledge and skills performance tests: Maine and Tennessee.⁷⁷ Nine required fitness level tests in high school: the same schools that require tests in middle school, plus Hawaii and Tennessee.⁷⁸

Even in states that do require fitness testing, many do not report those results to parents or guardians who are arguably in the best position to help students change habits if necessary. Only 26 percent of schools in a recent survey provided fitness test results to parents.⁷⁹ In some cases, the results are

⁷⁴ U.S. Centers for Disease Control and Prevention. *School Health Policies and Programs Study 2006. State-level school health policies and practices*. Available at:

http://www.cdc.gov/HealthyYouth/shpps/2006/summaries/pdf/PEPA_State_Level_Summaries_SHPPS2006.pdf

⁷⁵ Id.

⁷⁶ Id.

⁷⁷ Id.

⁷⁸ Id.

⁷⁹ Johnston L, Delva J, O'Malley P. "Sports participation and physical education in American secondary schools: Current levels of racial/ethnic and socioeconomic disparities." *American Journal of Preventive Medicine*, 33(4): 2007, S195-208.

merely recorded by the school to comply with requirements and no further action is taken. In a few instances, the results are analyzed to determine areas of improvement either at the school or student level, but this is rare due to the limited resources of schools.

Since 2006, legislation regarding fitness testing has been passed in South Carolina, Texas, and Delaware. South Carolina's HB 3499 (2007) requires all public schools to participate in the state's physical education assessment program. Reporting to parents and guardians is required for students in grades 5-8.⁸⁰

SB 530 (2007) in Texas requires fitness testing for students in grades 3-12, but does not require schools to send the results to families.⁸¹

In 2006, Delaware passed HB 372, requiring districts to assess the physical fitness of their students at least once in elementary, middle, and high school, and to provide results to students' parents, guardians, or relative caregivers.⁸²

Evaluation of School Health

The School Health Index (SHI) is a self-assessment and planning tool that schools can use to improve their health and safety policies and programs. It was created by the National Center for Chronic Disease Prevention and Health Promotion at the CDC. There are eight modules that a school-based SHI team can use to evaluate various aspects of its school's healthiness. The modules are:

1. School Health and Safety Policies and Environment
2. Health Education
3. Physical Education and Other Physical Activity Programs
4. Nutrition Services
5. Health Services
6. Counseling, Psychological, and Social Services
7. Health Promotion for Staff
8. Family and Community Involvement

Starting on July 1, 2006, all Tennessee public schools have been required to implement modules 1, 3, and 4 of the SHI. As of August 23, 2007, SHI assessments were being conducted in all eight modules in Tennessee.⁸³

Some schools in Rhode Island and Arizona have also implemented SHI. Studies of schools in both locations found common barriers to implementing nutrition and physical activity change, including

⁸⁰ Arkansas Center for Health Improvement (ACHI). *The Arkansas assessment of childhood and adolescent obesity: Year 4 (Fall 2006 – Spring 2007)*. Available at: http://www.achi.net/ChildObDocs/ACHI_2007_BMI_Online_State_Report.pdf.

⁸¹ Id.

⁸² Robert Wood Johnson Foundation. *Balance: A report on state action to promote nutrition, increase physical activity and prevent obesity*. End of Year Report. Issue 3, 2006. Available at: <http://www.rwjf.org/pdf/balance122006.pdf>.

⁸³ Winborn D. *Coordinated school health: The Tennessee experience*. Available at: <http://www.healthystates.csg.org/NR/rdonlyres/F8326EED-CB06-47EA-B5B2-1902666E50D6/0/Winburn.pdf>.

pressures to focus on reading and math test scores, low staff buy in, budgetary concerns, and inconsistent support from administrators.⁸⁴

BMI Data Collection

Several states have passed legislation to require the collection of student BMI information. Depending on the legislative requirements specifying what must and can be done with the information, student BMI information can be used by states, districts, schools, and families to target students who are particularly at risk of becoming overweight or obese. The range of steps that states take after collecting the information varies, as detailed below.

Arkansas Child Health Reports

In 2003, Arkansas became the first state to pass legislation promoting comprehensive measures to address the childhood and adolescent obesity epidemic when it passed Act 1220.⁸⁵ Act 1220 created a statewide Child Health Advisory Committee (CHAC) and required every Arkansas public school to measure its students' BMIs annually and report it to parents with an explanation of the ramifications of their student's BMI.⁸⁶ BMI is reported on Child Health Reports that classify children as underweight, normal weight, at risk for overweight, or overweight. The Arkansas Center for Health Improvement (ACHI) collects and tracks each student's BMI, while schools provide guidance on nutrition and physical activity.⁸⁷

Not only has Arkansas passed this legislation, but it is constantly improving its implementation. In 2004-2005, ACHI piloted a new web-based technology to simplify and streamline the data collection process in 11 schools.⁸⁸ It was expanded to 216 schools in 16 districts in 2005-2006 and to all districts in 2006-2007.⁸⁹ A current study is identifying the most effective ways to convey the information on the Child Health Report to parents and clinicians. In addition, it is likely that the Child Health Report will

⁸⁴ Pearlman DN, Dowling E, Bayuk C et al. "From concept to practice: Using the School Health Index to create healthy school environments in Rhode Island elementary schools." *Prev Chronic Dis*. Available at: http://www.cdc.gov/PCD/issues/2005/nov/0_0070.htm.

⁸⁵ Arkansas Center for Health Improvement (ACHI). *The 2005 Arkansas assessment of childhood and adolescent obesity*. Available at: <http://www.achi.net/ChildObDocs/2005%20BMI%20Statewide%20Report.pdf>.

⁸⁶ Arkansas Center for Health Improvement (ACHI). *The Arkansas assessment of childhood and adolescent obesity: Year 1: 2003-2004*. Available at: <http://www.achi.net/ChildObDocs/2004%20Statewide%20BMI%20Report.pdf>.

⁸⁷ Arkansas Center for Health Improvement (ACHI). *The Arkansas assessment of childhood and adolescent obesity – Tracking progress: Year 3 (Fall 2005 – Spring 2006)*. Available at: <http://www.achi.net/ChildObDocs/2006%20BMI%20Statewide%20Report.pdf>.

⁸⁸ Arkansas Center for Health Improvement (ACHI). *The 2005 Arkansas assessment of childhood and adolescent obesity*. Available at: <http://www.achi.net/ChildObDocs/2005%20BMI%20Statewide%20Report.pdf>.

⁸⁹ Arkansas Center for Health Improvement (ACHI). *The Arkansas assessment of childhood and adolescent obesity – Tracking progress: Year 3 (Fall 2005 – Spring 2006)*. Available at: <http://www.achi.net/ChildObDocs/2006%20BMI%20Statewide%20Report.pdf>; Arkansas Center for Health Improvement (ACHI). *The Arkansas assessment of childhood and adolescent obesity: Year 4 (Fall 2006 – Spring 2007)*. Available at: http://www.achi.net/ChildObDocs/ACHI_2007_BMI_Online_State_Report.pdf.

soon include other health information from a child's school health screenings as well as the child's BMI over time to enable parents to track their child's risk for obesity over time.⁹⁰

In 2007, the Arkansas Legislature passed Act 1172, reducing the frequency of BMI assessments from annual in K-12 to bi-annual. Forthcoming, assessments will be done in all even grades from K-10. The 2007 legislation also includes improved oversight to ensure confidentiality and updated training with a certification and re-certification component for those conducting the assessments.⁹¹

Other States

Pennsylvania's Department of Health monitors childhood obesity with a Growth Screening program from K-4 and will expand the program in three grades each year until all grade levels are included. The program requires schools to measure students' height and weight and plot the results against CDC growth charts. The Department of Health has also provided suggestions for how schools should inform parents of the results.⁹²

New York requires students to have completed health certificates to attend school. After SB 2108 passed in 2007, the health certificates now include BMI and weight status category.⁹³

The Illinois Department of Human Services includes space for BMI reporting and risk for diabetes on their Certificate of Child Health Examination, which is required for all public and private schools in Illinois.⁹⁴ Schools in Illinois must measure students' BMIs in first, fifth, and ninth grades.⁹⁵ In California, BMI is measured in fifth, seventh, and ninth grades and students must be provided with their individual results either orally or in writing.⁹⁶ The aggregate physical fitness test results are also presented in the school accountability report card.⁹⁷

⁹⁰ Arkansas Center for Health Improvement (ACHI). *The Arkansas assessment of childhood and adolescent obesity: Year 4 (Fall 2006 – Spring 2007)*. Available at: http://www.achi.net/ChildObDocs/ACHI_2007_BMI_Online_State_Report.pdf.

⁹¹ Id.

⁹² Robert Wood Johnson Foundation. *Balance: A report on state action to promote nutrition, increase physical activity and prevent obesity*. Mid-Year Overview. Issue 2, 2006. Available at: <http://www.rwjf.org/files/publications/other/Balance072006.pdf>.; Robinson V, Lear J and Eichner N. *The role of school health professional in preventing childhood overweight*. The Center for Health and Health Care in Schools. April 2006.

⁹³ Robert Wood Johnson Foundation. *Balance: A report on state action to promote nutrition, increase physical activity and prevent obesity*. End of Year Report. Issue 5, 2007. Available at: <http://www.rwjf.org/pdf/balance122007.pdf>.

⁹⁴ Illinois Certificate of Child Health Examination Code. Information available at: http://www.isbe.state.il.us/research/pdfs/px_requirements.pdf. Certificate available at: http://www.idph.state.il.us/health/vaccine/child_hlth_forms/cert_child_hlth05.pdf.

⁹⁵ National Association for Sport and Physical Education and American Heart Association. *2006 Shape of the nation*. Available at: <http://www.aahperd.org/naspe/ShapeoftheNation>.

⁹⁶ Cal. Educ. Code 60800.

⁹⁷ Id.

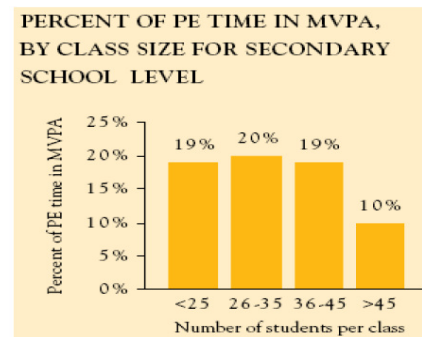
Maine's LD 1866 (2007) requires the collection, analysis, and reporting of height and weight or BMI information from all students in grades K, 1, 3, 5, 7, and 9.⁹⁸

Focus on Promoting Physical Activity instead of Physical Education Minutes

As of 2006, 19 states have required minimum time spent in elementary school physical education class. 17 states have set minimum times for middle schools, and 32 for high schools.⁹⁹ However, student fitness levels are positively correlated to the amount of time that children are active, not the amount of time they are in physical education. While physical education time requirements are not unusual, physical activity level requirements are. Since the Healthy People 2010 target for MVPA is 50% of total physical education time, more focus should be on increasing children's engagement in physical activity.

As of 2007, Texas is the only state that has required a particular amount of moderate or vigorous physical activity. Texas Education Code 28.002 (2007) requires K-5 students to participate in moderate or vigorous physical activity for at least 30 minutes each day during the school year. For grades 6-8, students must participate in moderate or vigorous daily physical activity for at least 30 minutes a day for at least four semesters.

Texas also mandates that schools implement a coordinated approach to state health that includes school involvement. There are four approved physical activity programs that schools can adopt under this approach: CATCH, Bienestar, Great Body Shop, and Healthy and Wise.¹⁰⁰



SOURCE: THE CALIFORNIA ENDOWMENT. *FAILING FITNESS: PHYSICAL ACTIVITY AND PHYSICAL EDUCATION IN SCHOOLS. ACTIVITY MATTERS FOR CALIFORNIA KIDS POLICY BRIEF. JANUARY 2007.*

Class Size

Students in large classes, as defined by the California Endowment as having over 45 students, are half as active as students in smaller classes.¹⁰¹ Although NASPE recommends a 25:1 student-teacher ratio in elementary school physical education classes, as of 2006, only 11 states (Alabama, Arkansas, Georgia, Louisiana, Missouri, New Hampshire, North Carolina, North Dakota, South Carolina, Tennessee, Vermont) and the District of Columbia specify the maximum class size for K-12 physical education classes.¹⁰² Maine and West Virginia establish a maximum class size for elementary school physical

⁹⁸ Robert Wood Johnson Foundation. *Balance: A report on state action to promote nutrition, increase physical activity and prevent obesity.* End of Year Report. Issue 5, 2007. Available at: <http://www.rwjf.org/pdf/balance122007.pdf>.

⁹⁹ U.S. Centers for Disease Control and Prevention. *School Health Policies and Programs Study 2006. State-level school health policies and practices* Available at: http://www.cdc.gov/HealthyYouth/shpps/2006/summaries/pdf/PEPA_State_Level_Summaries_SHPPS2006.pdf

¹⁰⁰ Texas Education Agency Approved Coordinated School Health Programs. Available at: <http://www.tea.state.tx.us/curriculum/hpe/approvedcshp.html>.

¹⁰¹ The California Endowment. *Failing fitness: Physical activity and physical education in schools.* Activity Matters for California Kids Policy Brief. January 2007.

¹⁰² Guideline for facilities, equipment and instructional materials for elementary education. Council of Physical Education for Children- A Position Paper from the National Association for Sport and Physical Education. July 2001. Available at:

education classes and Utah and Virginia establish a maximum only in middle and high school classes.¹⁰³ Less than 30% of states have a maximum student to teacher ratio on physical education classes at any school level.

It is important to note that class size alone is not enough to increase students' MVPA. A California study found that students in small classes still only spend about 20% of class time engaged in MVPA, far less than the 50% recommended by Healthy People 2010.¹⁰⁴

Professional Development

Professional development, particularly for elementary school classroom teachers who are teaching physical education classes, is important so that teachers know the best ways to engage their students in MVPA. There is evidence that as many as 85% of physical education classes in elementary school are taught by classroom teachers with no training in how to teach physical education.¹⁰⁵

The School Health Policies and Programs Study (SHPPS) is a national survey conducted by the CDC to assess school health policies and practices at the state, district, school, and classroom levels. SHPPS identified 16 areas of professional development deemed important for physical education teachers.¹⁰⁶ They are:

1. Administering or Using Fitness Tests
2. Assessing or Evaluating Student Performance
3. Developing and Using Student Portfolios
4. Developing Individualized Physical Activity Plans
5. Encouraging Family Involvement in Physical Activity
6. Injury Prevention and First Aid
7. Methods of Inclusion and Participation of Overweight Children
8. Methods to Increase Amount of Class Time Students are Active
9. Methods to Promote Gender Equity
10. Recognizing and Responding to Chronic Health Conditions
11. Teaching Individual or Paired Activities or Sports
12. Teaching Movement Skills or Concepts

http://www.aahperd.org/NASPE/pdf_files/pos_papers/instructional_mat.pdf; U.S. Centers for Disease Control and Prevention. *School Health Policies and Programs Study 2006. State-level school health policies and practices* Available at: http://www.cdc.gov/HealthyYouth/shpps/2006/summaries/pdf/PEPA_State_Level_Summaries_SHPPS2006.pdf.

¹⁰³ U.S. Centers for Disease Control and Prevention. *School Health Policies and Programs Study 2006. State-level school health policies and practices* Available at: http://www.cdc.gov/HealthyYouth/shpps/2006/summaries/pdf/PEPA_State_Level_Summaries_SHPPS2006.pdf.

¹⁰⁴ The California Endowment. *Failing fitness: Physical activity and physical education in schools*. Activity Matters for California Kids Policy Brief. January 2007.

¹⁰⁵ Sallis JF and McKenzie TL. "Physical education's role in public health." *Research Quarterly for Exercise and Sport*, 62, 124-137: 1991.

¹⁰⁶ U.S. Centers for Disease Control and Prevention. *School Health Policies and Programs Study 2006. State-level school health policies and practices* Available at: http://www.cdc.gov/HealthyYouth/shpps/2006/summaries/pdf/PEPA_State_Level_Summaries_SHPPS2006.pdf

13. Teaching Students with Long-Term Disabilities
14. Teaching Team or Group Activities or Sports
15. Using Physical Activity Monitoring Devices
16. Using Technology for Physical Education

From 2004-2006, there were only five states, Connecticut, Hawaii, Minnesota, New Jersey, and New Mexico, that provided either funding for staff development or staff development in all 16 of these areas.¹⁰⁷

In addition to these five states, other states providing funding for staff development or staff development in some areas. 12 additional states provided funding or development in the areas dealing with student assessment (areas 1-4): Delaware, Iowa, Kansas, Maryland, Mississippi, Nevada, New York, South Carolina, Utah, Virginia, West Virginia, and Wisconsin.¹⁰⁸

9 states provided support with curriculum that is directly relevant to the childhood obesity epidemic (areas 7-9). Delaware, Iowa, Kansas, Maryland, New Hampshire, New York, North Dakota, Virginia, and Wyoming provided support in these areas.¹⁰⁹

Areas 11-14 and 16 deal with curriculum generally. 12 states, Kansas, Maryland, Nebraska, New Hampshire, New York, North Carolina, Oklahoma, South Carolina, Utah, Virginia, West Virginia, and Wisconsin provided support in these areas.¹¹⁰

State Regulations

Various states have passed laws mandating minimum time spent in physical education classes, regarding nutrition standards of school lunches, and other actions related to student wellness. Researchers at George Washington University Law School and the Institute for Health Research and Policy at the University of Illinois are coding all state regulations involving physical education, physical activity, and nutrition in schools in order to determine the impact of these regulations on behavior change.¹¹¹

All state laws are expected to be coded using these two systems by Fall 2008. This information will be available through the National Policy & Legal Analysis Network to Prevent Childhood Obesity (NPLAN).

State Enforcement Mechanisms

Another challenge to increasing physical activity in K-12 schools is that there are few systematic methods to measure, monitor, or enforce current requirements for physical activity. Researchers at

¹⁰⁷ Id.

¹⁰⁸ Id.

¹⁰⁹ Id.

¹¹⁰ Id.

¹¹¹ For information regarding the development of the classification system, see Masse LC, Chiqui JF, Igoe JF, et al. "Development of a physical education-related state policy classification system (PERSPCS). *American Journal of Preventive Medicine*, 33(4S), S264-S276, 2007.

George Washington University Law School and Northeastern University School of Law Public Health Advocacy Institute are compiling a comprehensive listing of state enforcement mechanisms.

The results of their research are expected to be released in October 2008. This information will be available through the National Policy & Legal Analysis Network to Prevent Childhood Obesity (NPLAN).

Physical Activity Program Case Studies

There are numerous existing programs whose aims include increasing physical activity for students that districts may consider implementing. The program case studies in this section are not comprehensive. For the purposes of this paper, programs in this section were selected because they have been widely disseminated, usually on a national level, and have been scientifically evaluated. The program costs are current as of August 2008.

Coordinated Approach to Child Health (CATCH)

Program Content

CATCH is a coordinated program for K-5 students that includes four core components: a cafeteria nutrition program, a physical activity and healthy eating classroom curriculum, a physical education program, and a family education and involvement program.¹¹²

Teachers and administrators responding to a survey sent out by the author of this report noted that “ongoing implementation (of CATCH) was not costly,” and that the program is very “teacher friendly.” While some respondents reported concerns regarding student comprehension of the program, student engagement, and community buy in, those results were uncommon, suggesting that these have more to do with individual school implementation than the program itself. Some respondents reported that CATCH was effective and staff, students, parents, and community members like the program.¹¹³

History

From 1991 to 1994, the National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health (NIH) funded a trial of CATCH. The program was implemented in 56 intervention schools in a randomized clinical trial with 40 control schools.¹¹⁴ The initial trial demonstrated that program participants engaged in more physical activity outside of school and that the increased levels of physical activity remained for three years post-intervention, although they did decrease each year post-intervention, demonstrating the need for long term programs.¹¹⁵

Beginning in 1997, researchers from the University of Texas, School of Public Health began a dissemination study in more than 4,000 elementary schools in Texas for a total of almost \$11 million

¹¹² History of CATCH. University of Texas, Health Science Center at Houston. School of Public Health.

¹¹³ Survey administered online from August 11, 2008 to August 25, 2008.

¹¹⁴ History of CATCH. University of Texas, Health Science Center at Houston. School of Public Health.

¹¹⁵ Nadar PR, Stone EJ, Lytle LA, et al. “Three-year maintenance of improved diet and physical activity.” *Archives of Pediatrics and Adolescent Medicine*, 153(7), 695-704: 1999.

dollars from various funding sources.¹¹⁶ Now, almost 50% of more than 2,000 elementary schools in Texas have adopted CATCH and more than 7,000 schools nationally have adopted CATCH.¹¹⁷

A later intervention trial that focused primarily on Hispanic youth found that the rate of childhood obesity from 3rd to 5th grade increased at a significantly lower rate in girls in CATCH schools (2%) than in control schools (13%).¹¹⁸ There was a similar trend with boys; their rate of obesity increased by 1% rather than 9% in control schools.¹¹⁹

In a five-year follow up study of the impact of CATCH, researchers found a slightly higher level of MVPA in intervention schools, but the difference between intervention and control schools was not statistically significant.¹²⁰ The CATCH five-year follow up study also found that staff training had the greatest impact on whether programs were still using CATCH, underscoring the importance of ongoing professional development.

Cost

The CATCH curriculum costs \$635 and includes classroom curriculum, a teacher's manual, PE activity boxes, PE guidebook, information regarding diabetes and tobacco use prevention, and an Eat Smart manual. Training for five participants from each of ten schools is \$4,500 and includes training on child nutrition/food service, classroom/family, and physical education. The total cost is \$5,135 or about \$2.17 per student in schools with 500 students each. With program implementation costs and supplementary materials (additional teacher manuals, photocopying, classroom accessories, family promotion, PE equipment, etc) factored in, the program costs about \$5,625 per school, which is about \$11.25 per student.¹²¹

Sports, Play & Active Recreation for Kids! (SPARK)

Program Content

SPARK is a physical education program aimed at increasing students' physical activity during and outside of school. It includes activities for physical education teachers as well as classroom teachers. Curriculum is available for students in K-8.

History

A multidisciplinary team at San Diego State University developed SPARK with a grant from the NHLBI of the NIH. The program includes elementary school active physical education curriculum, staff

¹¹⁶ History of CATCH. University of Texas, Health Science Center at Houston. School of Public Health.

¹¹⁷ Id.

¹¹⁸ Coleman KJ, Tiller CL, Sanchea J, et al. "Prevention of the epidemic increase in child risk of overweight in low-income schools." *Archives of Pediatrics and Adolescent Medicine*, 159, 217-224: 2005.

¹¹⁹ Id.

¹²⁰ Hoelscher DM, Feldman HA, Johnson CC, et al. "School-based health education programs can be maintained over time: Results from the CATCH Institutionalization study." *Preventive Medicine*, 38, 594-606: 2004.

¹²¹ Provided by Peter Cribb, CATCH National Program Director.

development, and on-site support.¹²² The curriculum, which provides developmentally appropriate yearly lesson plans, includes components for both classroom teachers and physical education specialists. Each 30 minute lesson includes a health related and fitness related activity. The initial study was done in 14 schools in two districts, Encinitas and Poway, CA.¹²³ The SPARK curriculum was used in each of two intervention groups; one was led by classroom teachers and the other by a physical education specialist. Students in both intervention groups engaged in more MVPA than the control group; the specialist-led students engaged in twice as much as the control. The effects of increased MVPA were greater for girls.¹²⁴

Due to the positive results of the initial study, beginning in 1994, SPARK made its program available on a contract basis, offering six to 12 hour training workshops.¹²⁵ Then, in 2000, the University of South Carolina administered a survey to schools that had adopted SPARK one to four years prior.¹²⁶ 80% reported that they were still using the program, used the lesson plans for at least half of their physical education lessons, and had equipment for at least half of their students. About 50% of respondents reported that over half the teachers at their school were using SPARK.¹²⁷ Interestingly, schools that did not have a standard physical education program prior to implementing SPARK were more likely to continue using SPARK. Demographic variables were not linked to program sustainability, but principal support was positively correlated to sustainability.¹²⁸

By 2006, SPARK had been implemented in over 2000 schools and recreational facilities.¹²⁹

Cost

The SPARK curriculum is sold by Sportime. Curriculum kits for Early Childhood, K-2, 3-5, 6-8 are available. For middle school, the manual is \$96.99. For K-2 and 3-6, the manual comes with an instructional media disk and costs \$149.99. These manuals include binders with hundreds of games, dances, and skill progressions. The lessons are ready-to-use. There is a high school teacher guidebook, which is \$26.99. It is not a complete curriculum like those for the other grade levels, but it includes sample lessons and assessment tools.

¹²² Dowda M, Sallis JF, McKenzie TL, et al. "Evaluating the sustainability of SPARK Physical Education: A case study of translating research into practice." *Research Quarterly for Exercise and Sport*, 76(1), 11-19: 2005.

¹²³ Id.

¹²⁴ Sallis JF, McKenzie TL, Alcaraz JE, et al. "The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students." *American Journal of Public Health*, 87(8), 1328-1331: 1997.

¹²⁵ Owen N, Glanz K, Sallis JF, et al. "Evidence-based approaches to dissemination and diffusion of physical activity interventions." *American Journal of Preventive Medicine*, 31(4S), S35-S44: 2006.

¹²⁶ Information provided by Jim Sallis, Professor of Psychology, San Diego State University; Director, Active Living Research.

¹²⁷ Dowda M, Sallis JF, McKenzie TL, et al. "Evaluating the sustainability of SPARK Physical Education: A case study of translating research into practice." *Research Quarterly for Exercise and Sport*, 76(1), 11-19: 2005.

¹²⁸ Id.

¹²⁹ Owen N, Glanz K, Sallis JF, et al. "Evidence-based approaches to dissemination and diffusion of physical activity interventions." *American Journal of Preventive Medicine*, 31(4S), S35-S44: 2006.

Ideally, teachers would attend a SPARK Workshop or Institute in addition to purchasing the curriculum. SPARK provides a workshop for up to forty people that costs \$2,699 for 1 full day (six hours) or \$4,699 for 2 full days (12 hours).¹³⁰ The host also must pay for the transportation costs of the SPARK trainer to the workshop site.¹³¹ SPARK also holds Institute that lasts for two days and costs \$399 per person. Included in the cost of the Workshop or Institute is lifetime support in the form of a monthly newsletter that includes pertinent information and an 800 number and email for teachers to ask questions of SPARK staff.

Middle-School Physical Activity and Nutrition (M-SPAN or SPARK 6-8)

Program Content

M-SPAN is the middle school equivalent of SPARK and is now referred to as SPARK 6-8. It was developed in response to a demand for a middle school SPARK program.¹³² It is also a physical education program whose goal is to increase students' physical activity, but M-SPAN focuses on helping physical education teachers to increase students' moderate to vigorous physical activity.

History

In 1997-1998, M-SPAN staff members, who were credentialed physical education teachers, helped 12 intervention middle schools in southern California implement its program and compared the results to 12 control schools. They provided three three-hour professional development sessions in the first year and two in the second year. The staff also made school site visits about twice monthly in the first year and monthly in the second.¹³³

Students' MVPA increased significantly, by 18%, after the second year, compared with 3% for control schools. The increase was larger for boys than for girls and only statistically significant for boys.¹³⁴

Teachers rated the content and quality of physical education sessions positively and most would highly recommend it to others.¹³⁵

Cost

The cost for M-SPAN training is the same as for SPARK. The M-SPAN curriculum costs \$96.99.

¹³⁰ Information provided by Nerissa Jack, SPARKS Programs Disseminations Associate.

¹³¹ Id.

¹³² Owen N, Glanz K, Sallis JF, et al. "Evidence-based approaches to dissemination and diffusion of physical activity interventions." *American Journal of Preventive Medicine*, 31(4S), S35-S44: 2006.

¹³³ McKenzie TL, Sallis JF, Prochaska JJ, et al. "Evaluation of a two-year middle-school physical education intervention: M-SPAN." *Medicine & Science in Sports & Exercise*, 36(8), 1383-1388: 2004.

¹³⁴ Id.

¹³⁵ Id.

Planet Health

Program Content

Planet Health integrates health curriculum into existing 6-8th grade classroom curriculum and provides activities to use in physical education classes. It is interdisciplinary and focuses on improving health and well-being while building and reinforcing language, arts, math, science, social studies, and physical education skills.

The Planet Health curriculum, which is aligned with the Massachusetts Department of Education Curriculum Frameworks, includes 35 ready-to-use classroom lesson plans and 31 physical education microunits, as well as FitCheck, as self-assessment tool for students. Besides curriculum, the book also includes a CD-ROM with reproducible worksheets, parent information and newsletters, school health resources, and other teacher resources materials, as well as access to a website with a PowerPoint teacher training.

History

The Planet Health curriculum was developed by Harvard University's Prevention Research Center on Nutrition and Research Activity (PRC). It was first implemented as part of a two year NIH controlled trial in ten Boston middle schools.¹³⁶ This trial led to a significant reduction in television watching for girls and boys and decrease in obesity for girls, particularly African American girls.¹³⁷ There were not significant increases in MVPA for either girls or boys, but decreased television consumption is believed to be correlated with obesity reduction.¹³⁸

Planet Health and Boston Public Schools (BPS) then partnered to disseminate Planet Health in a sample of six inner-city middle schools to test how feasible and sustainable the curriculum would be in resource constrained public school settings. PRC provided curriculum, training workshops, stipends for teacher coordinators in each school, and research expertise. 78-100% of the teachers planned to continue using the Planet Health curriculum and over 90% found the curriculum effective.¹³⁹

After this pilot, BPS secured funding from the U.S. Department of Education to expand the pilot to 12 schools in 2002-2003 and subsequently more funding from the Boston Public Health Commission as part of the U.S. Department of Health and Human Services' STEPS program.

¹³⁶ Centers for Disease Control and Prevention. *Planet Health for Obesity Reduction in School Children—Readily Accepted and Cost-Effective*. Adoptable Interventions. Available at: <http://www.cdc.gov/prc/selected-interventions/adoptable-interventions/planet-health-obesity-reduction-school-children.htm>

¹³⁷ Gortmaker SL, Peterson K, Wiecha J et al. "Reducing obesity via a school-based interdisciplinary intervention among youth." *Archives of Pediatrics and Adolescent Medicine*, 153: 409-418, 1999.

¹³⁸ Id.

¹³⁹ Centers for Disease Control and Prevention. *Planet Health for Obesity Reduction in School Children—Readily Accepted and Cost-Effective*. Adoptable Interventions. Available at: <http://www.cdc.gov/prc/selected-interventions/adoptable-interventions/planet-health-obesity-reduction-school-children.htm>

From 2001-October 2006, more than 4000 copies of the curriculum were purchased in 48 states, 20 countries.¹⁴⁰

Cost

The Planet Health curriculum can be purchased from Human Kinetics for \$49. An independent cost benefit analysis concluded that at an estimated cost of \$14 for each student each year, which includes teacher training, wellness sessions, and fitness funds, the program resulted in an estimated savings of \$15,887 in medical costs and \$25,104 in loss productivity costs by the time students reach middle age (40-65).¹⁴¹

Eat Well & Keep Moving

Program Content

Eat Well & Keep Moving addresses both nutrition and physical activity in 4th and 5th grade classrooms. There are six components of the program: classroom education, physical education, school-wide promotional campaigns, food service, staff wellness, and parent involvement.¹⁴² Together, these are intended to create a supportive learning environment that promotes lifelong good habits.

The Eat Well & Keep Moving curriculum includes 46 ready-to-use classroom lesson plans and physical education microunits, as well as FitCheck, as self-assessment tool for students. Besides curriculum, the book also includes a CD-ROM with lessons and worksheets, as well as access to a website with a PowerPoint teacher training. If teachers still have questions about the program, they can contact researchers at the Harvard School of Public Health who developed the program.¹⁴³

History

An evaluation study conducted from Fall 1995 to Spring 1997 examined the effect of East Well & Keep Moving in Baltimore math, science, language arts, and social studies classes over two years.¹⁴⁴ Television viewing was marginally reduced in the intervention group of six schools, but there were no significant changes in physical activity levels.

¹⁴⁰ Franks AL, Kelder SH, Dino GA, et al. "School-based programs: Lessons learned from CATCH, Planet Health, and Not-On-Tobacco." *Preventing Chronic Disease*, 4(2), 1-9: 2007. Available at: www.cdc.gov/pcd/issues/2007/apr/06_0105.htm.; Centers for Disease Control and Prevention. "Reading, writing, and reducing obesity." October 2006. Available at: http://www.cdc.gov/prc/stories-prevention-research/stories/planet_health.htm.

¹⁴¹ Wang LY, Yang Q, Lawry R, et al. "Economic analysis of a school-based obesity prevention program." *Obesity Research*, 11(11), 1313-1324: 2003.

¹⁴² Gortmaker SL, Cheung LW, Peterson KE, et al. "Impact of a school-based interdisciplinary intervention on diet and physical activity among urban primary school children: Eat Well & Keep Moving." *Archives of Pediatrics & Adolescent Medicine*, 153(9), 975-983: 1999.

¹⁴³ Information provided by Lillian Cheung, Director of Health Promotion & Communication Department of Nutrition Harvard School of Public Health.

¹⁴⁴ Gortmaker SL, Cheung LW, Peterson KE, et al. "Impact of a school-based interdisciplinary intervention on diet and physical activity among urban primary school children: Eat Well & Keep Moving." *Archives of Pediatrics & Adolescent Medicine*, 153(9), 975-983: 1999.

By 2000, staff members at 65 Baltimore elementary schools were trained and 40 schools were actively implementing the program.¹⁴⁵ The program began nationally available in January 2001 through Human Kinetics.

Cost

The Eat Well & Keep Moving curriculum can be purchased from Human Kinetics for \$54. Teachers can also enroll in an online course through the Framingham State College for \$159 and earn one graduate credit.¹⁴⁶

Energizers

Program Content

Energizers is a classroom based physical activity program that is available for K-5 and middle school. Each activity lasts for about ten minutes and is integrated into the classroom curriculum. The activities can be downloaded for free and require no equipment and little teacher preparation.¹⁴⁷ An elementary school principal from North Carolina noted that Energizers “worked well to increase student attention” and a Texas physical education teacher said they were easy to implement.¹⁴⁸ A physical education and health program manager in North Carolina also noted that classroom teachers are “excited about integrating activity into academic subjects” and “students remain excited during the day (and have more) time on task.”¹⁴⁹

History

In 2004, an intervention group of 135 third and fourth grade students was compared to a control group of 108 students in the same grades. Researchers measured the change in the number of steps they took and their level of on-task behavior during class. Classroom teachers attended a 45 minute training session and an Energizers booklet that included activities.¹⁵⁰

Data was collected over a period of 12 weeks. Students’ physical activity outcomes were measured by the number of steps they took during school. The intervention group students took significantly more steps (782) than the control group. Over the course of a year, this would lead to students walking 70 extra miles a year.¹⁵¹

¹⁴⁵ *Motivating children to change their eating and activity habits*. Dannon Institute. Available at: http://www.dannon-institute.org/pdf/eat_well.pdf.

¹⁴⁶ See Framingham State College at <http://www.framingham.edu/dgce/opdce.htm>.

¹⁴⁷ Mahar MT, Murphy, SK, Rowe DA, et al. “Effects of a classroom-based program on physical activity and on-task behavior.” *Medicine & Science in Sports & Exercise*, 38(12), 2086-2094: 2006.

¹⁴⁸ Survey administered online from August 11, 2008 to August 25, 2008.

¹⁴⁹ Id.

¹⁵⁰ Mahar MT, Murphy, SK, Rowe DA, et al. “Effects of a classroom-based program on physical activity and on-task behavior.” *Medicine & Science in Sports & Exercise*, 38(12), 2086-2094: 2006.

¹⁵¹ Id.

The effect of Energizers on on-task behavior was also measured by observing an intervention group of 37 third graders and 25 fourth graders 30 minutes before and after the Energizer activity. This resulted in students in the intervention group being on task 8% more than their peers in the control group. For the most off-task students, the improvement was 20% compared to their peers in the control group.¹⁵²

Energizers become more widely available in 2005. At this time, 85% of district in North Carolina use Energizers and about 28,000 teachers have been trained.¹⁵³

Cost

The Energizer activities can be downloaded for free from www.ncpe4me.energizers.html.

Take 10!

Program Content

Take 10! is a classroom based physical activity program for K-5 students that integrates a daily ten minute physical activity into the academic curriculum.

History

During the Spring semester of 2001, teachers were given a two hour training session and then a class each of 1st, 3rd, and 5th graders using Take 10! were observed.¹⁵⁴ This study did not compare these students to a control group or the level at which teachers implemented the program after being trained. It did show that students that participated in Take 10! were more active, which is unsurprising given that they were doing at least ten minutes of activity during a time in which they were previously sitting still.

Cost

The Take 10! Materials Kit includes activity cards, worksheets, posters, teacher resources, and evaluation/assessment tools. Each kit costs \$82 and is grade specific.¹⁵⁵

¹⁵² Id.

¹⁵³ Personal communication with Mahar MT, June 25, 2008.

¹⁵⁴ Stewart SA, Dennison DA, Kohl III HW, et al. Exercise level and energy expenditure in the Take 10! in-class physical activity program." *Journal of School Health*, 74(10), 397-400: 2004.

¹⁵⁵ Information available at: <http://www.take10.net/order.asp>.

Physical Activity Case Program Comparison Chart

Program	Dissemination Year ¹	Grade Level			Demonstrated Short Term Effect on Physical Activity Level	Implement in		Curriculum Includes ²		Cost	
		K-5	6-8	9-12		Class-room	PE Class	Physical Activity	Nutrition	Curriculum	Training Per Teacher
CATCH	1997	X			Yes	X	X	X	\$635.00	\$90.00	
SPARK	1994	X			Yes	X	X	X	\$149.99	\$67.48 - \$117.48	
MSPAN	1999		X		Yes	X	X	X	\$96.99	\$67.48 - \$117.48	
Planet Health	2001		X		No	X	X	X	\$49.00	N/A	
Eat Well & Keep Moving	2001	X (4-5)			No	X	X	X	\$54.00	\$159 ³	
Energizers	2005	X	X		Yes	X		X	Free online	N/A	
Take 10!	2002	X			Yes	X		X	\$82.00	N/A	

¹ Dissemination year refers to the year that the program became available on a widespread basis, as opposed to in a few schools for the purposes of testing the effectiveness of the intervention.

² This refers to components included in the curriculum at more than a very basic level. For example, while SPARK and M-SPAN mention nutrition concepts, the majority of the program is focused on physical activity.

³ This is the cost for an online course teachers can take through the Framingham State College to earn one graduate credit.

Methodology to Determine Effective Program Components

There is no clear consensus regarding which program components are most effective in increasing children's physical activity levels. There are two main factors causing this result: (1.) no comprehensive scientific study has examined the effects of program components in isolation and (2.) even if there were such a study, it would have little impact since there are no standard definitions for program components like family or nutrition education, etc. Despite this lack of consensus, it is important to identify, as best one can, the most effective program components with the information that is available. To this end, this report's Best Program Components section relies on existing qualitative and quantitative research, interviews with researchers and NPLAN learning community members, and results from surveys sent to principals, teachers, and parents/guardians who had implemented various types of programs in their schools.

Best Program Components¹⁵⁶

Public health experts have identified several areas as particularly important for quality physical education.¹⁵⁷ They include curriculum, class size, professional development, physical environment, funding, legislation, and targeted girls programs.¹⁵⁸ Since the focus of this report is on action that districts and schools can take, it focuses on curriculum and professional development, as well as the necessary assessment tools to determine whether progress is being made toward established measurable goals.

Curriculum

Quality, evidence-based curriculum is essential to increasing students' physical activity, but there is little guidance about effective programs or evaluations of how well curriculum meets state or national standards for physical education.¹⁵⁹ CDC's Task Force on Community Preventative Services and the Institute of Medicine (IOM) strongly recommend activity-focused physical education.¹⁶⁰ Various

¹⁵⁶ Many interventions target multiple factors affecting prevalence of childhood obesity. For the sake of this paper, only the physical education pieces will be discussed.

¹⁵⁷ This is based on research done by San Diego State University and the Active Living Research Center, UCLA School of Public Health's Center to Eliminate Health Disparities, California Center for Public Health Advocacy, Institute of Medicine, CDC's Task Force on Community Preventive Services. San Diego State University and the Active Living Research Program, UCLA School of Public Health's Center to Eliminate Health Disparities and the California Center for Public Health Advocacy. *Physical education matters*. The California Endowment. January 2008.; Kahn EB, Ramsey LT, Health GW et al. *Increasing physical activity: A report on recommendations of the task force on community preventive services*. Centers for Disease Control, Task Force on Community Preventive Services. 2001. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5018a1.htm>.; Koplan JP, Liverman CT, Kraak VI, Eds. *Preventing Childhood Obesity: Health in the Balance*. Washington, DC: National Academies Press, 2005.

¹⁵⁸ San Diego State University and the Active Living Research Program, UCLA School of Public Health's Center to Eliminate Health Disparities and the California Center for Public Health Advocacy. *Physical education matters*. The California Endowment. January 2008.

¹⁵⁹ Id.

¹⁶⁰ Kahn EB, Ramsey LT, Health GW et al. *Increasing physical activity: A report on recommendations of the task force on community preventive services*. Centers for Disease Control, Task Force on Community Preventive Services. 2001. Available at:

programs have demonstrated that curriculum that is mindful of providing opportunities for all students to engage in a variety of activities have had more success at increasing students' physical activity.¹⁶¹

Professional Development

The most important predictor of whether a program's diffusion is successful is training and in-person, hands-on training is preferable.¹⁶² Teacher familiarity and comfort with substantive content is a key predictor of success. Also, critical program elements are frequently omitted due understandably to time constraints. Without knowing which elements are essential, these omissions can undermine the program's effectiveness.¹⁶³

Challenges

Facing pressure to raise standardized test scores and increased amounts of punitive legislation for failing to do so, schools are confronted with considerable challenges to implementing effective programs to increase their students' physical activity. Before adopting programs to achieve this goal, schools must carefully consider the effectiveness of the program, the cost per student, and the practical and political feasibility of implementing the program.

The following recommendation section is structured to address these challenges and considerations.

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5018a1.htm>.; Koplan JP, Liverman CT, Kraak VI, Eds. *Preventing Childhood Obesity: Health in the Balance*. Washington, DC: National Academies Press, 2005.

¹⁶¹ Sallis JF, McKenzie TL, Alcaraz JE, et al. "The effects of a 2-year physical education program (SPARK) on physical activity and fitness in elementary school students." *American Journal of Public Health*, 87(8), 1328-1331: 1997.; McKenzie TL, Sallis JF, Prochaska JJ, et al. "Evaluation of a two-year middle-school physical education intervention: M-SPAN." *Medicine & Science in Sports & Exercise*, 36(8), 1383-1388: 2004.; McKenzie TL, Nader PR, Strikmiller PK et al. "School physical education: Effect on the child and adolescent trial for cardiovascular health." *Preventative Medicine*, 25, 423-431:1996.; Pate RR, Ward DS, Saunders RP et al. "Promotion of physical activity among high-school girls: A randomized controlled trial." *American Journal of Public Health*, 95: 1582-1587, 2005.

¹⁶² Owen N, Glanz K, Sallis JF, et al. "Evidence-based approaches to dissemination and diffusion of physical activity interventions." *American Journal of Preventive Medicine*, 31(4S), S35-S44: 2006.

¹⁶³ Id.

Part IV: Recommendations¹⁶⁴

Increasing students' MVPA is only part of how schools can reduce the prevalence of overweight or risk of overweight among their students. This paper focuses on increasing MVPA, but it should be kept in mind that this is just one aspect of a schools' role in promoting healthy lifestyles for students, both during school and after school hours.

Broadly, there are three levels of reform that districts can lead and support to increase students' physical activity.

1. Structural Change (state and district)
2. School Environment (district and school)
3. Student Behavior (school and student)

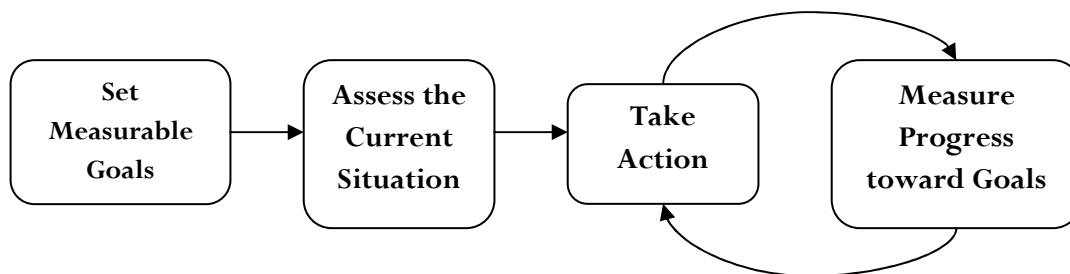
Structural change involves many dimensions, including lobbying, federal and state legislation, multiagency collaboration, and Department of Education restructuring, that are outside the scope of this paper. Consequently, the recommendations in this section focus on changing the school environment and student behavior.

These recommendations are not recommendations in the traditional sense where there is one existing program whose benefits significantly outweigh its costs. Instead, each district has unique characteristics that will influence which types of programs are best for its community. In some cases, existing programs available commercially will be sufficient; in others, districts and schools will need to select a variety of components to best suit the student population.

This section aims to assist school boards and districts committed to increasing physical activity during the school day in determining how best to meet the needs of their community. School districts and schools should engage in a process that involves the following steps:

1. Set Measurable Goals
2. Assess the Current Situation
3. Take Action
4. Measure Progress toward Goals

Steps 3 and 4 should be repeated continuously until the goals are achieved or revised.



¹⁶⁴ Since state action can substantially affect what a district is required or able to do, these recommendations are based on an assumption that the state's present trends continue.

Each of the next four sections includes steps that can be taken by either districts or schools. Which entity (the district or individual schools) funds, mandates, or implements these steps will depend on factors including the size of the district, available funding, how centralized or decentralized the district's school finance system is, and the level of existing political will and community support. The sections also include a table that assesses the anticipated impact, cost per student, practical and political feasibility of implementation for each recommendation.

Definitions

Anticipated impact refers both to the number of students who can be reached and the extent to which that exposure might lead to a behavior change. High indicates a recommendation that would reach 67-100% of the targeted student population and likely lead to a behavior change. Medium indicates a recommendation that reaches 34-66% of the targeted student population and might lead to a behavior change. Low reaches 0-33% of the target student population and probably will not result in a behavior change for most students involved. In instances where the number of students who would be reached and the extent to which that exposure might lead to a behavior change does not fall into the same category, they are classified as consistent with the less impactful one. Note that a high impact program targeting girls would target 67-100% of girls in the district, not the total student population in the district.

A high cost per student indicates a recommendation that has a substantial cost that would require a major shifting of currently allocated resources or additional revenue raising above \$201/student; Medium indicates one with a need for resources \$101-\$200/student; Low indicates that this recommendation will take little to no funding, \$0-\$100/student. The estimated costs are based solely on direct costs and an average California school size of 535, 887, and 1,535 students for K-5 elementary, 6-8 middle, and 9-12 high school respectively.¹⁶⁵ The estimate does not include optional expenditures or costs that may arise, like hiring additional staff or replacing equipment over time. Therefore, districts and schools using this report should consider the unique needs of their community and tailor the following suggestions accordingly.

For practical implementation, challenging indicates that the recommendation requires a long term implementation plan, coordination of multiple parties, and bureaucratic hurdles; Medium is one that

¹⁶⁵ These averages are rough estimates based on calculations based on statistics from:

California Department of Education - Educational Demographics Unit. *California Public Schools – Statewide Enrollment Report*. Available at: <http://dq.cde.ca.gov/dataquest/StateEnr.asp?cChoice=StEnrGrd&cYear=2006-07&cLevel=State&ctopic=Enrollment&myTimeFrame=S&submit1=Submit;Ed-Data. Schools by type. State of California, 2006-07>. Available at: <http://www.ed-data.k12.ca.us/Navigation/fsTwoPanel.asp?bottom=%2Fprofile%2Easp%3Flevel%3D04%26reportNumber%3D16>.

They do not include students in the following types of schools: K-12, alternative, continuation, special education, county, juvenile court, community day, opportunity, CYA, non-public, state special schools. The other schools only account for 4% of the total student population in California. They also combine middle and junior high students and count them as middle school students.

requires some coordination and bureaucracy; Easy indicates the recommendation can be implemented quickly with little coordination and bureaucracy.

For political feasibility, feasibility of implementing a recommendation is considered with the current school board and district administrators. Infeasible indicates a recommendation that is strongly disfavored by the current school board and district administration; Feasible is one that the board and administration are either indifferent to or can be relatively easily convinced to undertake; Very Feasible indicates one that the current board and administration either supports itself or will undertake with little convincing.

Step 1: Set Measurable Goals

School districts and schools should set goals that can be measured so that interventions can be evaluated and assessed based on the extent to which goals are being achieved and related to both input and output factors. These goals should be tailored to the communities that the district serves and can be aimed at community members and school staff, as well as students. The following are some examples of measurable goals that a district or school might set:

Input Goals	Output Goals
*x% of children will increase their MVPA by y%	* x% of children will reduce their BMI by y% in z time
*x% of children will engage in y minutes of MVPA each week	* x% of children will be below their BMI-for-age 95 th percentile in z time
*x% of children will have physical education class y times each week	*children's on task behavior will increase by x% in z time
*x% of schools will offer all-girls PE classes	*x% of respondents will rate new school program positively
*all district schools will send out health report cards to families by z date	*African American females will rate new PE programs more positively than previous ones
*x% of families will attend an information session to understand how to read health report sent by school	*x% of families that attend a health report information session will demonstrate comprehension of the information and take at least one of the suggested follow up steps
*x% of physical education and/or classroom teachers will attend professional development	*x% of physical education and/or classroom teachers will implement new strategies into their curriculum to increase student physical activity
*x% of district schools will participate in a wellness awareness event	*x% of students and families will adopt new practices based on learning from a wellness event

Step 2: Assess the Current Situation

In order for districts and schools to determine what type of program is best for them, they need to assess the needs of their schools and students. As the program becomes a regular part of the school, these initial assessments can be used to measure the extent to which their goals are being achieved. Continual assessments are important to determine how much progress has been achieved and reassess whether goals should be refocused.

POSSIBLE RECOMMENDATIONS	ANTICIPATED IMPACT ¹⁶⁶ (High, Medium, Low)	COST/ STUDENT (High, Medium, Low)	IMPLEMENTATION	
			PRACTICAL (Challenging, Medium, Easy)	POLITICAL FEASIBILITY (Infeasible, Feasible, Very Feasible)
School Health Assessment	Medium	Low	Challenging	Feasible
Physical Education Curriculum Assessment	Medium	Low	Medium	Feasible
Student Assessments	Medium	Low	Medium	Very Feasible / Feasible
Data Collection	Medium	Low/High ¹⁶⁷	Challenging	Feasible
Legal Compliance Audit	Medium	Medium	Challenging	Feasible

School Health Assessment

Schools need to know how well they are currently able to support youth in increasing their physical activity in order to make improvements. Similarly, it would be unrealistic to expect youth to increase their physical activity if they did not have the information or role models to do so. There are several types of tools readily available to assist schools in assessing their programs ability to increase students; MVPA.

School Health Index (SHI)

One existing type of comprehensive assessment for school sites is the SHI. As noted earlier in the Innovative State Action section, the SHI is a self-assessment and planning tool that schools can use to improve their health and safety policies and programs. It was created by the National Center for

¹⁶⁶ The anticipated impact of all of these recommendations is medium because, while they have the potential to have a high impact if action is taken based on these assessments, assessments alone will not have a high impact since the assessments are useful only if the information is used to systematically evaluate how students can improve their levels of MVPA and how schools can introduce structural change based on the information.

¹⁶⁷ Whether the cost of maintaining or developing and updating a database with student fitness indicators is low or high will depend on whether the database already exists, the sophistication of the district or school's Information Technology department, how integrated the database is with other stakeholders' databases in the school, district, and other public agencies.

Chronic Disease Prevention and Health Promotion at the CDC. There are eight modules that the school-based SHI team can use to evaluate various aspects of the schools' healthiness. The modules are:

1. School Health and Safety Policies and Environment
2. Health Education
3. Physical Education and Other Physical Activity Programs
4. Nutrition Services
5. Health Services
6. Counseling, Psychological, and Social Services
7. Health Promotion for Staff
8. Family and Community Involvement

The Division of Adolescent and School Health (DASH) at the CDC has created a training network to provide schools that are implementing SHI with support. For a limited number of sites, CDC will pay for all of the expenses associated with the trainer and the site will only have to cover facility and materials costs. More information about scheduling training can be found on the CDC website.¹⁶⁸

Impact

The SHI is a valuable tool to help schools understand how well they are meeting the comprehensive health needs of its school community and what areas it can target for improvement. If implemented well, it will have a high impact as it allows schools to focus on areas identified by researchers as important to improve schools' overall health.

Cost

The SHI can be downloaded or ordered from the CDC for free.¹⁶⁹ Dedicating time to perform the SHI assessments and work on applying changes will require costs in terms of personnel who would ordinarily be doing other things. These costs will vary by district and school depending on who is involved and how much needs to be done.

Implementation

Initially, assembling the SHI team may take some logistical maneuvering to get team members together at the same time. The initial assessment, however, might only take a few meetings, depending on the level of agreement from team members about the current state of the school's healthiness. The SHI is very easy to follow, which also reduces time spent working through directions. Once the SHI has been used to identify focus areas to improve, taking action based on this will bring with it practical and political challenges that will be discussed in the Take Action section.

Physical Education Curriculum Assessment Analysis

Examining how current physical education lines up with research based standards can be useful to schools and districts in evaluating how well their current curriculum can meet student needs.

¹⁶⁸ See <http://www.cdc.gov/HealthyYouth/DTrain/index.htm> for more information about SHI training.

¹⁶⁹ CDC. *School Health Index*. Atlanta, GA, 2006. Available at: <http://apps.nccd.cdc.gov/SHI/Static/Paper.aspx>.

Physical Education Curriculum Analysis Tool (PECAT)

The PECAT is a type of curriculum analysis that was developed by the National Center for Chronic Disease Prevention and Health Promotion at the CDC and is used to analyze written physical education curriculum to determine how closely the curriculum is aligned to national physical education standards.¹⁷⁰ A school district team should include a variety of people including physical education coordinators, teachers, curriculum specialists, public health professionals, school nurses, families, and students who work together to determine how well the school's curriculum is meeting students' needs. There are three main parts of PECAT: curriculum description, content and student assessment analysis, and curriculum improvement plan. It takes 4-8 hours to review physical education curriculum using PECAT and then varying amounts of time to implement the second two parts depending on how well the school is doing based on national physical education standards.

DASH also has workshops to help sites implement PECAT. As with SHI, for a limited number of sites, CDC will pay for all of the expenses associated with the trainer and the site will only have to cover facility and materials costs. More information about scheduling training can be found on the CDC website.¹⁷¹

Impact

PECAT gives schools a concrete idea of where their school stands and how it can improve its curriculum vis-à-vis national standards developed by NASPE.

Cost

Schools can download a PDF of PECAT for free on the CDC website or order paper copies at no charge. There is a limit on the latter; schools can order up to two copies of the curriculum, up to ten copies of the brochure and FAQs, and up to 30 copies of the user guide.¹⁷²

Implementation

Like with the SHI, it will take some initial logistical coordination to gather the PECAT team, but once together, the initial assessment should not take more than a few meetings. The PECAT binder is very self explanatory and if team members come to the table ready to consider how to improve the current curriculum and not defensive about maintaining the status quo, implementation should not be too difficult. Again like the SHI, once areas of improvement are identified, taking action may present more challenges.

Student Assessments

Using multiple forms of student assessments provides stakeholders with a more complete picture of a youth's current healthiness.

¹⁷⁰ CDC. *Physical Education Curriculum Analysis Tool*. Atlanta, GA, 2006. Available at: <http://www.cdc.gov/healthyouth/PECAT/index.htm>.

¹⁷¹ See <http://www.cdc.gov/HealthyYouth/DTrain/index.htm> for more information about SHI training.

¹⁷² CDC. *Physical Education Curriculum Analysis Tool*. Atlanta, GA, 2006. Available at: <http://www.cdc.gov/healthyouth/PECAT/index.htm>.

Qualitative Surveys

When statistics are not readily available, qualitative surveys can be used to assess the current situation. There are national surveys like SHPPS, but it is useful to perform these types of surveys at a local level to learn more about student physical activity, facility use, activity preference, available programs, personal habits, etc, in that environment.

Impact

This local information will be more useful to drive improvement and increase the physical activity of students since it is particular to the needs and challenges of that community.

Cost

The cost for a qualitative survey is generally low and will depend largely on the site's ability to create and disseminate the survey and interpret its results.

Implementation

Administering qualitative surveys does not take a significant amount of time and should not present any major implementation challenges. It is essential, however, that these surveys are well constructed to maximize the quality and reliability of the feedback, so that the findings can be generalized to the community's overall student population.

BMI Screening

Schools often collect student height and weight information, but they are increasingly using this information to calculate students' BMI and categorize students as overweight or at risk of overweight. Schools and districts vary greatly in what they do with this information.

Impact

The impact of BMI screening depends largely on the follow up. If the data is just collected, there is little impact. If parents are notified or programming is altered based on the results, the impact is more significant.

It is important to note that the American Academy of Pediatrics warns against screenings like BMI if there are not enough resources to follow up.¹⁷³

Cost

The cost for BMI screening is very low. More costs arise from follow up procedures that are discussed in the Take Action section.

Implementation

It is very easy to implement BMI screenings. Most schools take height and weight measurements annually any way. BMI screening is sometimes politically controversial, but as the childhood obesity epidemic spreads and increases in magnitude, there is gaining acceptance of the need to collect this type of information.

¹⁷³ American Academy of Pediatrics, Committee on School Health. *School health: Policy & practice*. Elk Grove, IL: American Academy of Pediatrics: 2004.

FITNESSGRAM/ACTIVITYGRAM

FITNESSGRAM is a comprehensive, educational, and promotional tool for fitness and activity assessment for children. Its goal is to improve children's health related (aerobic capacity, body composition, muscular strength and endurance, flexibility) fitness.¹⁷⁴ Results are individualized to each child, comparing his or her performance to the established health standard, the Healthy Fitness Zone, and do not have to be shared with peers. The results can be used to track student progress over time as well as identify a school's needs and target particular areas where students are not performing well.

The ACTIVITYGRAM is a behaviorally based physical activity assessment tool that provides a three-day record of activities performed during 30 minute periods. It is completed over two school days and one non-school day. A computer software program converts the information into a summary analysis report.

Impact

Like with BMI screening, the impact of FITNESSGRAM/ACTIVITYGRAM depends on what is done with the results, including whether parents are notified and advised regarding the results. In addition, the culture established at the school around the importance of the results can contribute to its effectiveness in helping students adopt healthier habits. For example, a teacher at a Texas middle school reported that FITNESSGRAM encouraged students to do more repetitions of exercises and to strive to get better times.¹⁷⁵ When a school establishes a culture where the FITNESSGRAM/ACTIVITYGRAM results are viewed as a guide for students to improve their own performance, the impact increases.

Cost

Schools can purchase standalone FITNESSGRAM/ACTIVITYGRAM software, a manual, and test kit, which includes basic equipment to perform assessments for \$299. For schools that want to network their site computers, the cost is \$319. For districts that want to network all schools, FITNESSGRAM/ACTIVITYGRAM SQL can be purchased with a license, manual, and test kit for \$1749.¹⁷⁶

Implementation

In California, the State Board of Education has designated FITNESSGRAM as the state's Physical Fitness Test that is administered in 5th, 7th, and 9th grades. Thus, in California, there are no political implementation challenges. Schools need to ensure that tests are administered systematically and more regularly to all students, but this should not present any serious implementation challenges, particularly because FITNESSGRAM/ACTIVITYGRAM does not require a lot of time to execute. An instructional facilitator at a Texas elementary school reported that ACTIVITYGRAM did not take much time.¹⁷⁷

¹⁷⁴ Purchasing FITNESSGRAM/ACTIVITYGRAM. Available at: [http://www.fitnessgram.net/txtrainers/overview.ppt#282,1,FITNESSGRAM/ACTIVITYGRAM Overview](http://www.fitnessgram.net/txtrainers/overview.ppt#282,1,FITNESSGRAM/ACTIVITYGRAM%20Overview).

¹⁷⁵ Survey administered online from August 11, 2008 to August 25, 2008.

¹⁷⁶ FITNESSGRAM/ACTIVITYGRAM Overview. Available at: <http://www.fitnessgram.net/store>.

¹⁷⁷ Survey administered online from August 11, 2008 to August 25, 2008.

Data Collection

In order for schools to determine if students are making progress, they must collect relevant information about students' fitness indicators and health status.

Impact

Having a user friendly database is essential to measuring the true impact that various interventions may have on students' levels of physical activity. It can be used to set a baseline against which to measure student improvement and set goals for individuals as well as sites. With a sophisticated database, it will also be easy to create reports that include various measures to show how the site or subgroups are progressing.

Cost

Whether the cost of maintaining or developing and updating a database with student fitness indicators is low or high will depend on whether the database already exists, the sophistication of the district or school's Information Technology department, how integrated the database is with other stakeholders' databases in the school, district, and other public agencies.

Implementation

Many districts already have databases to collect student information that have the capacity to add fitness indicators or link the current database to one that includes fitness information. This eases implementation. Implementation may be challenging if stakeholders are not bought in, but given the value of a database, implementation should not be a major barrier as long as leadership explains to all stakeholders the value of the system and training on how to update and use information.

Legal Compliance Audit

There are many districts that do not follow laws regarding physical education. Most commonly, schools fail to adhere to minimum physical education time requirements. This is often due to various requirements for the use of instructional minutes that exceed the total number of instructional minutes in a school day. By using an audit to determine which requirements they are not complying with, districts can gain credibility with advocacy groups that may not necessarily view districts as allies in promoting student health and can also use this as leverage when negotiating with those who do not support spending more time on physical activity related curriculum in school.

Impact

If the purpose of engaging in this type of analysis is to ensure compliance, the impact will be determined by how compliant the school or district already is and how committed they are to taking action to become compliant if they are not already.

Cost

Many large school districts have general counsel, so they will not have to hire additional staff to do this work. For smaller districts that have contract counsel, this might involve a higher cost. However, non-attorneys are capable of performing an audit with adequate training. The real cost will arise more from follow up actions whose need will be revealed by such an analysis of compliance.

Implementation

Most districts have general counsel that are responsible for this type of work, but whether they focus on legal compliance is a matter of district priorities. In addition, if the district reveals that they are not compliant and does not take action, it could make them susceptible to lawsuits making this effort challenging. Politically, the district may decide that it is less controversial to not call attention to their shortcomings even at the cost of its students' wellbeing.

Step 3: Take Action

The challenges that arise when attempting to take action seem to stem less from an inability to convince people that physical education and activity are important than from difficulty that districts and schools face when weighing their options in the face of multiple mandates and time and budget constraints. 71% of state government employees developing and implementing policies and programs to prevent chronic disease and promote better health strongly favored "increasing physical education and activity in schools."¹⁷⁸

This section outlines three areas that schools and districts should focus attention on:

1. Increase Students' Physical Activity
2. Model and Teach Healthy Active Behavior
3. Secure External Support to Increase Sustainability

Increase Students' Physical Activity

POSSIBLE ACTIONS	ANTICIPATED IMPACT (High, Medium, Low)	COST/ STUDENT (High, Medium, Low)	IMPLEMENTATION	
			PRACTICAL (Challenging, Medium, Easy)	POLITICAL FEASIBILITY (Infeasible, Feasible, Very Feasible)
Implement activity-based PE programs	High	Low ¹⁷⁹	Medium	Feasible
Incorporate physical activity into classroom curriculum	High	Low	Low	Very Feasible
Provide ongoing professional development for PE and classroom teachers	High	Low/ Medium	Medium	Feasible

¹⁷⁸ Trust for America's Health. *F as in Fat: How obesity policies are failing in America*. 2007. Available at: <http://healthyamericans.org/reports/obesity2007/Obesity2007Report.pdf>.

¹⁷⁹ The cost will depend on the programs selected for implementation, but generally the costs per student are low. If a school opts to hire additional staff, it will increase the overall cost, which could affect the cost per student depending on the school size.

Implement Activity-Based Physical Education Programs

The implementation of a program aimed at increasing physical activity is obviously important, but it is essential that schools are (1.) realistic about what a program can achieve in a short period of time and (2.) support those implementing it. As the program becomes a regular part of the curriculum, schools need to continually revisit their goals and measure the extent to which they are being achieved.

Impact

Most activity-based programs target the entire student population and so impact all students. Depending on the regularity of class, implementing activity-based physical education programs will likely have a high impact. Other programs target high need populations and also have a high impact given their targeted reach.

Cost

Most program costs, when spread across all student participants, are low. Even the most expensive case study program, CATCH, in an average size California elementary school with 535 students would only cost \$8.13 per student.¹⁸⁰

Implementation

Any challenge to integrating new curriculum into a class will have to do mostly with will and building consensus. School staff will have to weigh the pros and cons of various programs and agree on a program to adopt. They will have to determine whether the program is helping them reach their goals and how long to stick with it if it is not immediately producing results.

Changing curriculum requires teachers to buy in so that they are committed to integrating the new curriculum and supporting students.

Politically, implementing an activity-based physical education program is very feasible given the recent scrutiny of schools and increased pressure on them to take action to address the childhood obesity epidemic. This pressure has led to an overall increased willingness by schools to focus attention and resources on addressing the epidemic.

Incorporate Physical Activity into Classroom Curriculum

Impact

Incorporating physical activity into classroom curriculum would have a high impact because all students would be engaging in these short activities.

Cost

The cost of this strategy is very low. The curriculum for these types of activities is very inexpensive, as shown in Part III in the Physical Activity Program Case Studies section of this paper.

Implementation

It is relatively easy for classroom teachers to add an activity that lasts just a few minutes into their every day curriculum. There is sufficient research evidence linking such activities to improved concentration

¹⁸⁰ This estimate is based on a set of curriculum for each grade and a trained teacher for each grade: $[6*(635+90)]/535 = \$8.13$

that even in schools that strongly emphasize test scores, teachers should be able to set aside a few minutes during each class to get students moving. In addition to research, teachers implementing programs that incorporate physical activity into the classroom curriculum have also reported its benefits. An elementary school principal from North Carolina noted that Energizers “worked well to increase student attention.” A physical education and health program manager in North Carolina also noted that and “students remain excited during the day (and have more) time on task.”¹⁸¹

Provide Ongoing Professional Development

Ongoing professional development is essential for PE and classroom teachers to increase students’ physical activity. Even the best curriculum will be ineffective if teachers are not equipped to implement it properly.

Impact

One of the most important aspects of whether a program succeeds in achieving its goals is initial and ongoing training for teachers.¹⁸² As long as teachers are trained in implementing whichever strategies the school adopts, the strategies will have a significant impact. Several teachers implementing CATCH in Texas noted the importance of both professional development and attending meetings with other teachers implementing the same program to discuss the progress of their students.¹⁸³

Cost

Professional development is usually low cost when the cost is distribution over all the teacher’s students.

Implementation

Even among well established programs, there are few that offer ongoing professional development; most training occurs initially to implement the program. Schools and districts should establish networks of teachers and schools that are using the same program so they can collaborate and address common challenges. It may be useful for these to be heterogeneous groups of teachers that are in various stages of implementation. That way, teachers who experience any challenges have a support system and can also share best practices regarding the program.

Establishing such networks can be challenging, especially if they involve staff at more than one school. The value of having continuously engaged teachers revisiting their curriculum and teaching strategies, however, is well documented.

¹⁸¹ Survey administered online from August 11, 2008 to August 25, 2008.

¹⁸² Owen N, Glanz K, Sallis JF, et al. “Evidence-based approaches to dissemination and diffusion of physical activity interventions.” *American Journal of Preventive Medicine*, 31(4S), S35-S44: 2006.

¹⁸³ Survey administered online from August 11, 2008 to August 25, 2008.

Providing ongoing professional development is politically feasible. A possible impediment might be a lack of belief that increasing physical activity can improve academic achievement. There is increasing research available to support this assertion, so it should not present a major barrier.¹⁸⁴

Model and Teach Healthy Active Behavior

For many youth most affected by the childhood obesity epidemic, the lack of exposure to models of healthy, active lifestyles is a real barrier to their participation in physical activity. In many communities, there are a variety of real, but surmountable challenges to maintaining healthy lifestyles, like lack of sidewalk space, bike lanes, or safe parks. Increased exposure to how to incorporate physical activity into their lives in their community is useful to get youth to think about their daily lives differently.

POSSIBLE ACTIONS	ANTICIPATED IMPACT (High, Medium, Low)	COST/ STUDENT (High, Medium, Low)	IMPLEMENTATION	
			PRACTICAL (Challenging, Medium, Easy)	POLITICAL FEASIBILITY (Infeasible, Feasible, Very Feasible)
School-based modeling of active lifestyles	Medium	Low	Easy	Feasible
Family/Community education	Medium	Low/ Medium	Medium	Very Feasible /Feasible

School-based Modeling of Active Lifestyles

Schools and teachers can help students think about how to live more active lives. By inviting guests from the community to share information about existing opportunities to get active, students will become more knowledgeable about what is available. By going on active field trips, students will get to practice this behavior in a non-intimating group setting so they are more likely to engage in such activities on their own.

Impact

These strategies have a medium impact because while they can have a high impact on youth who as a result incorporate these new activities into their lives, the youth ultimately have to make the decision to engage in these activities.

Cost

Community members are usually willing to visit classes at no cost. Field trips range in cost, but in most places, schools can arrange field trips with very low costs, such as taking public transportation or walking to a local park. In addition, by demonstrating to youth how they can get to these places on their own at low or no cost, youth are more likely to return on their own.

¹⁸⁴ Owen N, Glanz K, Sallis JF, et al. "Evidence-based approaches to dissemination and diffusion of physical activity interventions." *American Journal of Preventive Medicine*, 31(4S), S35-S44: 2006.

Implementation

The practical implementation of these strategies is easy. It entails getting field trip permission slips signed and scheduling community guests to present during the school day.

One feasible challenge is political resistance to diverting school time away from the academic curriculum, but once the community is bought into the importance of physical activity and understands its positive affect on academic achievement, implementation should be easy.

Family and Community Education

Schools have a responsibility to keep families informed of the progress of their students. This applies to students' progress in regards to their physical activity as well as their academics. Schools can mail student fitness reports home, engage in fitness awareness campaigns, or host family education meetings. In addition to sharing information with families, schools can teach families to ask the right questions in order to increase political pressure on entities controlling funding that can help schools increase their students' physical activity.

Impact

There are a wide variety of ways that schools can keep families informed how their students are doing from mailing progress reports to launching public education campaigns to hosting family and community meetings. Providing families with information about their students' healthiness and strategies to increase their physical activity can have a high impact if families are making permanent changes in their lives based on the information. However, the degree of impact depends on the decisions of the families.

Cost

Most of the strategies listed above have very low costs per student. In most districts, there is already at least one community engagement liaison. In addition, at most schools, there is someone who is tasked with community outreach and parental involvement. These strategies have more to do with incorporating specific actions into existing job descriptions than with amassing additional costs.

Implementation

Coordinating mailings can be logistically difficult in terms of updating addresses. It can also be challenging to get parents to school meetings and to reach target groups out in the community. All of these strategies are politically very feasible, however, given the overwhelming recognition that schools can not solely be responsible for stemming the childhood obesity epidemic and the importance of family involvement.

Secure External Support to Increase Sustainability

POSSIBLE ACTIONS	ANTICIPATED IMPACT (HIGH, MEDIUM, LOW)	COST/ STUDENT (HIGH, MEDIUM, LOW)	IMPLEMENTATION	
			PRACTICAL (Challenging, Medium, Easy)	POLITICAL FEASIBILITY (Infeasible, Feasible, Very Feasible)
Apply for grants to fund strategies to promote physical activity	High	Low	Medium	Infeasible
Limit physical education class sizes	Medium	High	Challenging	Feasible

Apply for Grants

Faced with seemingly endless budget constraints, school district officials should actively seek out and apply for grants to fund strategies to promote physical activity. With increasing attention being paid to the childhood obesity crisis, funders want to see districts take proactive steps so they can show what strategies work and demonstrate that they are willing to take action to stem the epidemic. The Robert Wood Johnson Foundation's (RWJF) goal is to reverse the childhood obesity epidemic by 2015 and has alone has pledged millions of dollars in active grants.¹⁸⁵

Impact

The impact of applying for and being awarded grant funding is high. Many districts cite funding as a barrier to taking action to increase youth's physical activity, but there is funding out there.

Foundations like RWJF are using their funds to set the agenda and schools are in a unique position to tap into this funding given the large amount of time youth spend in school each day.

Cost

There are usually people at the district level that write grants to raise funds for various endeavors for which schools need resources, so the cost per student is low.

Implementation

Implementation is practical and politically feasible given the growing recognition of the childhood obesity epidemic. There are many things that districts need funding for, so diverting attention to writing grants focused on increasing physical activity might divert attention from other worthy areas, making implementation medium, not low.

¹⁸⁵ Complete list of active grants available at: <http://www.rwjf.org/childhoodobesity/grantlist.jsp>.

Limit Physical Education Class Sizes

Impact

The impact of limiting physical education class sizes is medium. Some research shows smaller classes have a positive effect on increasing students' physical activity. There may be an unintended quality teacher drain as occurred with class size reduction.

Cost

Since salaries are the highest cost item in every school's budget, the cost of hiring additional teachers to reduce physical education class sizes will be high.

Implementation

Implementing smaller class sizes is challenging due largely to scheduling coordination. By reducing class sizes, there will necessarily be more physical education classes, which, given space constraints, will require classes to be offered at more times, creating increased conflicts with other classes. While this could become politically feasible, it currently is not feasible. Reducing physical education class size is not a priority and the research is not definitive on how effective smaller class sizes will be.

Step 4: Measure Progress toward Goals

The importance of measuring progress toward achieving goals can not be overstated. Districts and schools need to continually assess their progress toward increasing MVPA as determined by their progress in achieving the measurable goals that were previously set. In addition, districts and schools need to determine if goals have changed, and if so, they need to redefine them. If the goals are unchanged and have not been reached, they should decide how long they should continue implementing their current strategies and when they should implement a different strategy.

Recommendations for Further Inquiry

In the last few years, more and more attention has been paid to the importance of increasing physical activity of youth, but there are still many research gaps that need to be addressed in order to effectively address this problem.

Focus on Long Term Solutions

Longitudinal Studies

More studies need to be done to determine the long term effects of interventions that have proven to have short term effects and even those that have not yet proven results in the short term. While it is useful to know if an intervention has had some positive effect over a period of a few years, if that effect dissipates in the long run, alternative solutions may have more of an impact. Current research does not allow us to make these kinds of determinations.

Comprehensive Approaches

Most interventions include various components that address nutrition and physical activity. Among them are classroom instruction during and after school, skill building, teacher training, and student competitions. Research needs to be done on which of these components are effective and what the optimal blend is of these various approaches.

Cultural Considerations

Some evidence exists that cultural and ethnic factors may affect whether groups accept the need for and support the idea of increasing youth's MVPA, but little has been to systematically examine what these factors that may influence the success of an intervention are.

Technology

New technology may reshape what comes to mind when conceptualizing physical education programs and physical activity. At least one study has looked at the impact of active video games on children's engagement in MVPA. While there were no significant differences found in MVPA, the study only lasted 12 weeks and involved 20 children.¹⁸⁶ In addition, the intervention group spent much less total time playing video games, which has previously been negatively correlated to obesity. West Virginia is incorporating Dance, Dance Revolution, a video-based dance game, into their physical education curriculum. The effort is being evaluated by a consortium comprised of West Virginia University, West Virginia Department of Education, Mountain State Blue Cross Blue Shield, and Konami Digital Entertainment, the creators of the game.¹⁸⁷

There is significant room in this field for further inquiry into how technology can be incorporated into current physical education and classroom curriculum.

Teacher Qualifications

The extent to which it improves student outcomes if a physical education class is taught by a teacher who has a physical education credential is unproven and may differ depending on school level. All states besides Colorado, Hawaii, Mississippi, and South Dakota require physical education teachers to be certified, licensed, or endorsed by their state.¹⁸⁸ Despite the prevalence of the requirement, there is evidence that in elementary school, there are many physical education classes, as much as 85%, that are not taught by credentialed physical education teachers.¹⁸⁹ There is some evidence that teacher qualifications matter. In studies of schools using CATCH and SPARK, students in classes taught by physical education specialists had better outcomes overall. This small sample, however, should not be used as the basis for determining how much of an impact a credential has on a physical education teacher's outcome. Particularly in elementary school, providing high quality professional development to classroom teachers may lead to similar positive outcomes. More research is needed to measure this impact, holding other relevant factors constant.

¹⁸⁶ Mhurchu CN, Maddison R, Jiang Y, et al. "Couch potatoes to jumping beans: A pilot study of the effect of active video games on physical activity in children." *International Journal of Behavioral Nutrition and Physical Activity*, 5(8): 2008. Available at: <http://www.ijbnpa.org/content/5/1/8>.

¹⁸⁷ Konami Digital Entertainment. *Konami Digital Entertainment and West Virginia Schools Develop Ground-Breaking Partnership*. 2006. Available at: <http://www.konami.com/gs/newsarticle.php?id-726>.

¹⁸⁸ U.S. Centers for Disease Control and Prevention. *School Health Policies and Programs Study 2006. State-level school health policies and practices*. Available at: http://www.cdc.gov/HealthyYouth/shpps/2006/summaries/pdf/PEPA_State_Level_Summaries_SHPPS2006.pdf

¹⁸⁹ Sallis JF and McKenzie TL. "Physical education's role in public health." *Research Quarterly for Exercise and Sport*, 62, 124-137: 1991.

Increasing Physical Activity Outside of School

There are various programs that target students' physical activity before and after school. Given the demands on schools to focus on academics, this is an important area to explore in order to ensure that students engage in physical activity throughout the day.

Commuting

Safe Routes to School (SRTS) is one such program that provides supervision for active transport to school. In Marin County, CA, the number of students who walked or biked to and from school increased 64% and 114% respectively over two years.¹⁹⁰ Despite this success, more research needs to be done to establish the effectiveness and cost benefit of this type of program versus other alternatives.

Joint Use

There are many different types of joint use agreements, but one of the most common is the use of school facilities by community members during non-school hours. Sometimes, this use is organized by non-school agencies or organizations and other times, the facilities are just available for anyone to use. By developing joint use agreements, schools can help maximize students' ability to engage in physical activity. More needs to be done in this area to facilitate the development of these agreements. While school districts across the country have done this in various ways, as of now, there is no established model for how to start such agreements.

The National Policy & Legal Analysis Network to Prevent Childhood Obesity (NPLAN) is developing model agreements to assist schools in developing joint use agreements and Planning for Healthy Places (PHP) is developing a joint use tool kit for California school districts, county health departments, and parks and recreation departments to create such agreements.

Recess

Although recess is during the school day, many schools have not capitalized on this time to organize physical activity programs. Programs like Sports4Kids attempt to systematically increase students' physical activity during this time. The effectiveness of programs like this has yet to be scientifically evaluated.¹⁹¹

¹⁹⁰ Staunton CE, Hubsmith D & Kallins W. "Promoting safe walking and biking to school: The Marin County success story. *Am J Public Health*, 93(9): 1431-1434, 2003.

¹⁹¹ D. Wenter, Evaluation Director, Sports4Kids (Personal Communication, July 2008). More information available at: <http://www.sports4kids.org>.

Conclusion

With almost a third of children and adolescents being overweight or at risk of overweight, the childhood obesity epidemic is a serious challenge that is finally being acknowledged by the majority of stakeholders.

Schools are in a unique position to take action to reverse this crisis given that most children spend many of their waking hours in school. Faced with increasing mandates that account for most of the school day, district officials, administrators, and teachers struggle to find ways to increase students' physical activity. An increasing recognition of the benefits that increased physical activity have on academic achievement and concentration have led to more acceptance of the need to adopt programs and strategies to help students engage in more moderate to vigorous physical activity.

School officials play a crucial role in making programmatic decisions that help families and students reduce students' prevalence of overweight or risk of overweight. The recommendations in this report aim to facilitate the process through which schools get more actively engaged in helping increase students' physical activity.