

Active Education

Physical Education, Physical Activity and Academic Performance

In schools across the United States, physical education has been substantially reduced—and in some cases completely eliminated—in response to budget concerns and pressures to improve academic test scores. Yet the available evidence shows that children who are physically active and fit tend to perform better in the classroom and that daily physical education does not adversely affect academic performance. Schools can provide outstanding learning environments while improving children's health through physical education.

Schools and Physical Activity

Today, obesity is one of the most pressing health concerns for children. Nearly one-third of children and teens, more than 23 million kids, are overweight or obese—and physical inactivity is a leading contributor to the epidemic. The Surgeon General recommends children should engage in 60 minutes of moderate activity most days of the week, yet estimates show that only 3.8 percent of elementary schools provide daily physical education (PE).¹

Schools serve as an excellent venue to provide students with the opportunity for daily physical activity, to teach the importance of regular physical activity for health, and to build skills that support active lifestyles. Unfortunately, most children get little to no regular physical activity while in school.

Budgetary constraints and increasing pressure to improve standardized test scores have caused school officials to question the value of PE and other physical activity programs. This has led to a substantial reduction in the time available for PE, and in some cases, school-based physical activity programs have been completely eliminated.² Yet advocates for school-based physical activity programs argue that allocating time for daily PE does not adversely impact academic performance, and that regular exercise may improve students' concentration and cognitive functioning.³⁻⁶



Key Research Results

Sacrificing physical education for classroom time does not improve academic performance

This summary of peer-reviewed research on the relationship between physical activity and academic performance among children and adolescents yields the following insights:

Many school systems have downsized or eliminated PE under the assumption that more classroom time will improve academic performance and increase standardized test scores. The available evidence from several controlled experimental studies in the United States,⁷ Canada,^{8–10} and Australia^{11,12} contradicts this view. All of these studies evaluated how additional instructional time for PE impacts academic performance, and clearly demonstrate that physical activity need not be sacrificed for academic excellence.

- In 2007, 287 fourth- and fifth-grade students in British Columbia were evaluated to determine if introducing daily classroom physical activity sessions affected their academic performance.¹³ Students in the intervention group participated in daily 10-minute classroom activity sessions in addition to having 80 minutes of PE per week. Despite increasing in-school physical activity time by approximately 50 minutes per week, students receiving the extra physical activity time had similar standardized test scores for mathematics, reading and language arts as did students in the control group.
- In 1999, researchers analyzed data from 759 fourth- and fifth-grade students in California and found that students' scores on standardized achievement tests were not adversely affected by an intensive PE program that doubled or tripled PE time. On several test scores, students who spent more time in PE performed better than students in control groups.¹⁴

Within the United States, results from a national longitudinal study¹⁵ and observational data from two studies that compared test scores of children who were exposed to different amounts of PE instructional time have shown that more time in PE does not adversely affect academic performance.^{16,17}

- Girls who were enrolled in PE for 70 or more minutes per week had significantly higher achievement scores in mathematics and reading than did girls who were enrolled in PE for 35 or fewer minutes per week, according to the National Early Childhood Longitudinal Study. Researchers analyzed a nationally representative sample of more than 5,000 students from the 1998–99 kindergarten class as they progressed through grade 5. Among boys, greater exposure to PE was neither positively or negatively associated with academic achievement.¹⁸
- A study of more than 200 sixth-grade students in Michigan, conducted in 2006, found that students enrolled in PE had similar grades and standardized test scores as students who were not enrolled in PE, despite receiving 55 fewer minutes of daily classroom instruction.¹⁹
- A study of 311 fourth-grade students in southeastern Massachusetts found that students who received 56 or more hours of PE per school year scored significantly higher on standardized test scores in English and language arts than did students who received 28 hours of PE per school year. The study, which was conducted in 2000–01, found no significant differences on standardized mathematics test scores.²⁰

Kids who are more physically active tend to perform better academically

Fourteen published studies analyzing data from approximately 58,000 students between 1967 and 2006 have investigated the link between overall participation in physical activity and academic performance. Eleven of those studies found regular participation in physical activity is associated with improved academic performance.

Eight health surveys involving population-representative samples of children and adolescents from the United States,²¹⁻²³ United Kingdom,²⁴⁻²⁶ Hong Kong²⁷ and Australia²⁸ observed statistically significant, positive correlations between physical activity participation and academic performance. However, none of these studies assessed academic performance with standardized educational tests.

- One of the studies, conducted in the United States in 2006, analyzed national data collected from nearly 12,000 adolescents to examine the relationship between physical activity and academic performance. Adolescents who reported either participating in school-based physical activities, such as PE and team sports, or playing sports with their parents were 20 percent more likely than their sedentary peers to earn an “A” in math or English.²⁹

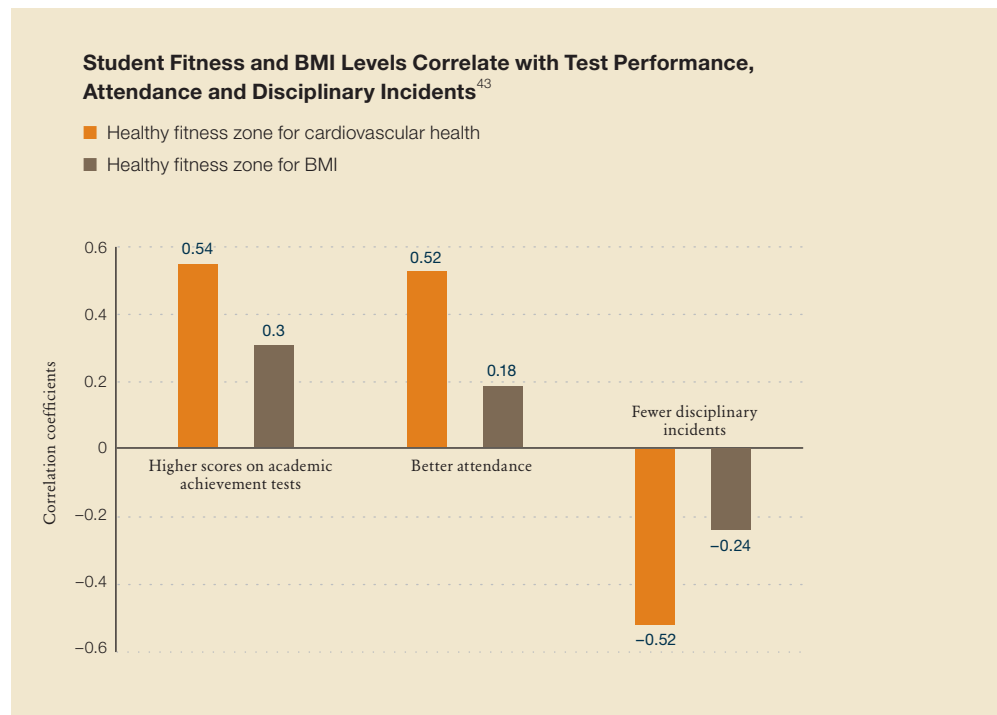
Three other smaller studies conducted between 1970 and 2006 involving students from one or two schools also reported a positive correlation between physical activity and academic performance.³⁰⁻³²

- Two studies found no evidence of a relationship, positive or negative, between physical activity and academic performance,^{33,34} and one study conducted in Canada in 2000 reported a trivial negative association between physical activity and standardized test scores.³⁵

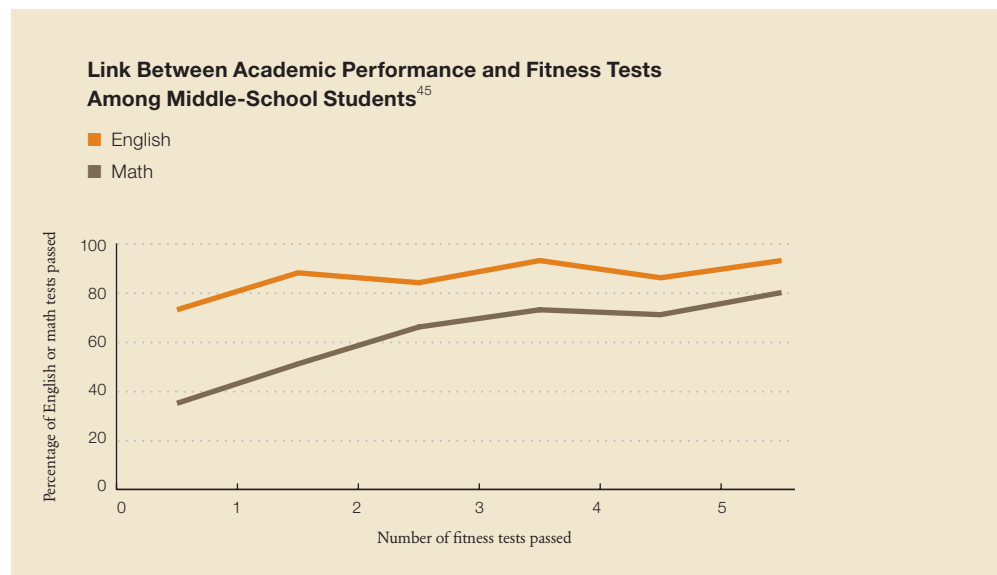
Kids who are physically fit are likely to have stronger academic performance

Evidence supporting the association between physical activity and enhanced academic performance is strengthened by findings that link higher levels of physical fitness with improved academic performance among children and teens. Two national studies, in Australia³⁶ and South Korea,³⁷ along with four studies conducted in the United States,³⁸⁻⁴¹ found physical fitness scores to be significantly and positively associated with academic performance. These studies included students from elementary school through high school.

- Researchers analyzed FITNESSGRAM® test results from more than 2.4 million Texas students in grades 3 to 12 during the 2007–08 school year and found significant school-level correlations between physical fitness achievement and better performance on state standardized tests. Higher physical fitness achievement also was associated with better school attendance rates and fewer disciplinary incidents involving drugs, alcohol, violence or truancy. Associations were stronger for cardiovascular fitness than for measures of body mass index (BMI), but the patterns were consistent. The analyses controlled for potential confounding variables, such as socioeconomic status, minority status and school size, that could influence the correlations. The study is currently in review, and as of August 2009, these data were unpublished.⁴²



■ A cross-sectional study of 2004–05 data from 1,800 Massachusetts middle-school students found that students who passed more fitness tests during physical education performed better on achievement tests in math and English than did students who had poorer fitness test results.⁴⁴



■ According to a 2007 study of 259 third- and fifth-grade students, children who performed better on aerobic capacity fitness tests were more likely to score higher on state math and reading exams.⁴⁶

Activity breaks can improve cognitive performance and classroom behavior

According to seven studies involving elementary-school students,^{47–53} and one survey of elementary- and middle-school administrators,⁵⁴ regular physical activity breaks during the school day may enhance academic performance, academic focus and/or behavior in the classroom. It is important to note that cognitive and behavioral responses to physical activity breaks during the school day have not been systematically investigated among middle- or high-school students.

- Teachers reported better classroom behavior for students who had more than 15 minutes of daily recess, according to an analysis of 1998–99 data for approximately 11,000 students ages 8 to 9. Thirty percent of students in the study had little or no daily recess. Further analysis showed that only 7 percent to 14 percent of black, Hispanic and low-income students had daily recess, compared with 54 percent to 67 percent of white and affluent students.⁵⁵
- A 2008 survey of representatives from 106 North Carolina school districts found that improved academic focus among students was the most widely cited benefit of a statewide policy mandating at least 30 minutes of daily physical activity for students in kindergarten through grade 8. Improvement in students' focus was reported by 27 percent of elementary-school officials and 15 percent of middle-school officials.⁵⁶
 - Other results from the survey showed increased student alertness (reported by 17% of elementary- and middle-school officials) and improved student behavior (reported by 12% of elementary-school officials and 8% of middle-school officials).⁵⁷
- In 1998, researchers in Georgia studied the effects of an activity break on classroom behavior in a sample of 43 fourth-grade students. Students exhibited significantly more on-task classroom behavior and significantly less fidgeting on days with a scheduled activity break than on days without one.⁵⁸
- A 12-week research project conducted in North Carolina in 2006 evaluated the effects of providing elementary-school students with a daily 10-minute activity break. Among 243 students in kindergarten through grade 4, a break without physical activity decreased on-task behavior, but a daily physical activity break increased on-task behavior significantly—by an average of 8 percent. Among the least on-task students, activity breaks improved on-task behavior by 20 percent.⁵⁹
- In a study conducted in 1999 with 177 New Jersey elementary-school students, researchers compared scores on a concentration test after students completed either a classroom lesson or a 15-minute physical activity session. Fourth-grade students exhibited significantly better concentration scores after completing the physical activity. Among second- and third-grade students, the physical activity intervention was neither beneficial nor detrimental to test performance.⁶⁰

Conclusion

- Studies consistently show that more time in physical education and other school-based physical activity does not adversely affect academic performance.
- In some cases, more time in physical education leads to improved grades and standardized test scores.
- Physically active and fit children tend to have better academic achievement.
- Evidence links higher levels of physical fitness with better school attendance and fewer disciplinary problems.
- There are several possible mechanisms by which physical education and regular physical activity could improve academic achievement, including enhanced concentration skills and classroom behavior.
- Additional research is needed to determine the impact of physical activity on academic performance among those children who are at highest risk for obesity in the United States, including black, Latino, American Indian and Alaska Native, and Asian-American and Pacific Islander children, as well as children living in lower-income communities.

Additional research on academic achievement and physical activity presented by the Centers for Disease Control and Prevention is available at www.cdc.gov/HealthyYouth/health_and_academics/index.htm.

- ¹ Lee S, Burgeson C, Fulton J, et al. "Physical Education and Physical Activity: Results from the School Health Policies and Programs Study 2006." *Journal of School Health*, 77(8): 435–463, October 2007.
- ² National Association for Sport and Physical Education and American Heart Association. *2006 Shape of the Nation Report: Status of Physical Education in the USA*. Reston, VA: National Association for Sport and Physical Education, 2006.
- ³ Shephard R. "Curricular Physical Activity and Academic Performance." *Pediatric Exercise Science*, 9(2): 113–126, May 1997.
- ⁴ Pellegrini A and Smith P. "Physical Activity Play: The Nature and Function of a Neglected Aspect of Play." *Child Development*, 69(3): 577–598, June 1998.
- ⁵ Tomporowski P. "Cognitive and Behavioral Responses to Acute Exercise in Youths: A Review." *Pediatric Exercise Science*, 15(4): 348–359, November 2003.
- ⁶ Sibley B and Etnier J. "The Relationship Between Physical Activity and Cognition in Children: A Meta-analysis." *Pediatric Exercise Science*, 15(3): 243–256, August 2003.
- ⁷ Sallis J, McKenzie T, Kolody B, et al. "Effects of Health-related Physical Education on Academic Achievement: Project SPARK." *Research Quarterly for Exercise and Sport*, 70(2): 127–134, June 1999.
- ⁸ Shephard R, Volle M, Lavallee H, et al. "Required Physical Activity and Academic Grades: A Controlled Longitudinal Study." 58–63. In: Ilmarinen J and Valimaki L (Eds.) *Children and Sport*. Berlin: Springer-Verlag, 1984.
- ⁹ Shephard R. "Habitual Physical Activity and Academic Performance." *Nutrition Reviews*, 54(4): S32–S36, April 1996.

- ¹⁰ Ahamed Y, MacDonald H, Reed K, et al. "School-based Physical Activity Does not Compromise Children's Academic Performance." *Medicine and Science in Sports and Exercise*, 39(1): 371-376, January 2007.
- ¹¹ Dwyer T, Blizzard L and Dean K. "Physical Activity and Performance in Children." *Nutrition Reviews*, 54(4): S27-S31, April 1996.
- ¹² Dwyer T, Coonan W, Leitch D, et al. "Investigation of the Effects of Daily Physical Activity on the Health of Primary School Students in South Australia." *International Journal of Epidemiology*, 12(3): 308-313, September 1983.
- ¹³ Ahamed Y, et al., 371-376.
- ¹⁴ Sallis J, et al., 127-134.
- ¹⁵ Carlson S, Fulton J, Lee S, et al. "Physical Education and Academic Achievement in Elementary School: Data From the Early Childhood Longitudinal Study." *American Journal of Public Health*, 98(4), 721-727, February 2008.
- ¹⁶ Coe D, Pivarnik J, Womack C, et al. "Effect of Physical Education and Activity Levels on Academic Achievement in Children." *Medicine and Science in Sports and Exercise*, 38(8): 1515-1519, August 2006.
- ¹⁷ Tremarche P, Robinson E and Graham, L. "Physical Education and its Effects on Elementary Testing Results." *Physical Educator*, 64(2), 58-64, March 2007.
- ¹⁸ Carlson S, et al., 721-727.
- ¹⁹ Coe D, et al., 1515-1519.
- ²⁰ Tremarche P, et al., 58-64.
- ²¹ Pate R, Heath G, 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, November 1996.
- ²² Fejgin N. "Participation in High School Competitive Sports: A Subversion of School Mission or Contribution to Academic Goals?" *Sociology of Sport Journal*, 11(3): 211-230, September 1994.
- ²³ Nelson M and Gordon-Larson P. "Physical Activity and Sedentary Behavior Patterns are Associated with Selected Adolescent Health Risk Behaviors." *Pediatrics*, 117(4): 1281-1290, April 2006.
- ²⁴ McIntosh P. "Mental Ability and Success in School Sport." *Research in Physical Education*, 1(1): 20-27, 1966.
- ²⁵ Smart K. "Sporting and Intellectual Success Among English Secondary School Children." *International Review of Sports Sociology*, 2(1): 47-54, 1967.
- ²⁶ Williams A. "Physical Activity Patterns Among Adolescents - Some Curriculum Implications." *Physical Education Review*, 11: 28-39, 1988.
- ²⁷ Lindner K. "Sports Participation and Perceived Academic Performance of School Children and Youth." *Pediatric Exercise Science*, 11(2): 129-143, May 1999.
- ²⁸ Dwyer T, Sallis J, Blizzard L, et al. "Relation of Academic Performance to Physical Activity and Fitness in Children." *Pediatric Exercise Science*, 13(3): 225-237, August 2001.
- ²⁹ Nelson M and Gordon-Larson P, 1281-1290.
- ³⁰ Coe D, et al., 1515-1519.
- ³¹ Schurr T and Brookover W. "Athletes, Academic Self-Concept and Achievement." *Medicine and Science in Sports*, 2(2): 96-99, Summer 1970.
- ³² Field T, Diego M and Sanders C. "Exercise is Positively Related to Adolescents' Relationships and Academics." *Adolescence*, 36(141): 105-110, Spring 2001.
- ³³ Daley A and Ryan J. "Academic Performance and Participation in Physical Activity by Secondary School Adolescents." *Perceptual & Motor Skills*, 91(1): 531-534, December 2000.
- ³⁴ Fisher N, Juszcak L and Friedman S. "Sports Participation in an Urban High School: Academic and Psychological Correlates." *Journal of Adolescent Health*, 18(5): 329-334, May 1996.
- ³⁵ Tremblay M, Inman J and Williams J. "The Relationship Between Physical Activity, Self-Esteem, and Academic Achievement in 12-year-old Children." *Pediatric Exercise Science*, 12(3): 312-323, August 2000.
- ³⁶ Dwyer T, et al., 225-237.
- ³⁷ Kim H, Frongillo E, Han S, et al. "Academic Performance of Korean Children is Associated with Dietary Behaviours and Physical Status." *Asia Pacific Journal of Clinical Nutrition*, 12(2): 186-192, June 2003.
- ³⁸ Knight D and Rizzuto T. "Relations for Children in Grades 2, 3, and 4 Between Balance Skills and Academic Performance." *Perceptual Motor Skills*, 76(2): 1296-1298, June 1993.

- ³⁹ Castelli D, Hillman C, Buck S, et al. "Physical Fitness and Academic Achievement in Third- and Fifth-Grade Students." *Journal of Sport and Exercise Psychology*, 29(2): 239–252, April 2007.
- ⁴⁰ Chomitz V, Slining M, McGowan R, et al. "Is There a Relationship Between Physical Fitness and Academic Achievement? Positive Results From Public School Children in the Northeastern United States." *Journal of School Health*, 79(1): 30–37, January 2009.
- ⁴¹ Welk G. *Cardiovascular Fitness and Body Mass Index are Associated with Academic Achievement in Schools*. Dallas, Texas: Cooper Institute, March 2009.
- ⁴² Ibid.
- ⁴³ Ibid.
- ⁴⁴ Chomitz V, et al., 30–37.
- ⁴⁵ Ibid.
- ⁴⁶ Castelli D, et al., 239–252.
- ⁴⁷ Gabbard C and Barton J. "Effects of Physical Activity on Mathematical Computation Among Young Children." *Journal of Psychology*, 103: 287–288, November 1979.
- ⁴⁸ Raviv S and Low M. "Influence of Physical Activity on Concentration Among Junior High School Students." *Perceptual and Motor Skills*, 70(1): 67–74, February 1990.
- ⁴⁹ McNaughten D and Gabbard C. "Physical Exertion and Immediate Mental Performance of Sixth-Grade Children." *Perceptual and Motor Skills*, 77(3 Pt. 2): 1155–1159, December 1993.
- ⁵⁰ Caterino M and Polak E. "Effects of Two Types of Activity on the Performance of Second-, Third-, and Fourth-Grade Students on a Test of Concentration." *Perceptual and Motor Skills*, 89(1): 245–248, August 1999.
- ⁵¹ Jarrett O, Maxwell D, Dickerson C, et al. "Impact of Recess on Classroom Behavior: Group Effects and Individual Differences." *The Journal of Educational Research*, 92(2): 121–126, November 1998.
- ⁵² Mahar M, Murphy S, Rowe D, et al. "Effects of a Classroom-Based Program on Physical Activity and On-Task Behavior." *Medicine and Science in Sports and Exercise*, 38(12): 2086–2094, December 2006.
- ⁵³ Barros R, Silver E and Stein R. "School Recess and Group Classroom Behavior." *Pediatrics*, 123(2): 431–436, February 2009.
- ⁵⁴ Evenson K, Ballard K, Lee G, et al. "Implementation of a School-Based State Policy to Increase Physical Activity." *Journal of School Health*, 79(5)231–237, May 2009.
- ⁵⁵ Barros R, et al., 431–436.
- ⁵⁶ Evenson K, et al., 231–237.
- ⁵⁷ Ibid.
- ⁵⁸ Jarrett O, et al., 121–126.
- ⁵⁹ Mahar M, et al., 2086–2094.
- ⁶⁰ McNaughten D and Gabbard C, 1155–1159.

Active Living Research, a national program of the Robert Wood Johnson Foundation, stimulates and supports research to identify environmental factors and policies that influence physical activity for children and families to inform effective childhood obesity prevention strategies, particularly in low-income and racial/ethnic communities at highest risk. Active Living Research wants solid research to be part of the public debate about active living.

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