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Physical Education and Academic Achievement: A Review

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Abstract

This review article explores the relationship of physical activity and academic performance. Studies conducted in the United States and abroad support one another in suggesting that when a substantial amount of school time is dedicated to physical activity, academic performance meets and may even exceed that of students not receiving additional physical activity.

Keywords: physical education; physical activity; academic performance

Introduction

The health benefits of engaging in regular physical exercise are widely accepted (Strong et al., 2005) but in spite of this acknowledgement, physical education in public schools is widely viewed as an extracurricular activity. In the face of pressured to improve test scores, physical education is often one of the first activities to be reduced or eliminated. In 2006, only 3.8% of elementary schools,

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7.9% of middle schools, and 2.1% of high schools offered students daily physical education opportunities for the entire school year. According to a national study conducted by the Center on Education Policy in 2007, since the passing of the No Child Left Behind Act in 2002, 62% of elementary schools and 20% of middle schools have increased their instructional time in reading, language arts and math. Trost and van der Mars (2010) found that 44 percent of school districts have reported cutting time in special areas, such as physical education and recess. In the meantime, children are facing an increased risk of obesity-related disorders, with the Centers for Disease Control and Prevention (CDC) reporting that one in three children and adolescents are already overweight or obese. In light of the threat physical inactivity poses to health, some are questioning if it is possible to justify cutting physical activity from the school day (Ehrlich, 2008). A greater understanding of the relationship between physical education and academic performance can help provide schools and organizations with the evidence needed to better design academic and physical activity programming. This paper will present existing evidence that physical education does not have a negative impact on academic achievement.

Physical Activity and Academic Achievement

The statement “healthy children learn better” is supported by the evidence in the literature (Ehrlich, 2008). Perhaps the most established relationship of health and achievement is between eating breakfast at school and academic performance. This is a relationship that persists regardless of socioeconomic status. Less established but increasingly supported by the literature is the link between school-based physical activity and academic performance (Castelli, Hillman, Buck, & Erwin, 2007; Chomitz et al., 2009). In a meta-analysis of 44 studies, Trudeau and Shephard (2008) cited evidence demonstrating that physical activity was positively associated with better cognitive functioning in children, with some age groups benefitting more than others. Published research has reported mixed results on the relationship between physical fitness and academic achievement; however, findings suggest that physical activity can have beneficial influences on student behavior that may result in increased academic performance. One study’s results indicated that there was “a consistent positive relationship between overall fitness and academic achievement” (Vail, 2006, p. 15). In a large national study, researchers found that for children in kindergarten through fifth grades, that girls with the highest exposure to physical education scored on average 2.4 points higher in reading and 1.5 points higher in mathematics than girls who had a lower exposure to physical education classes (Carlson et al, 2008). The researchers also found that there seemed to be no association between physical education and academic achievement for boys. The authors concluded that

physical activity during school hours did not harm academic achievement and in fact, had the potential to benefit academic performance.

Evidence from the literature.

It is commonly thought that spending time outside of the classroom on physical activity reduces children's opportunities for proper classroom instruction and therefore negatively affects their overall education in reading, language arts, and math (Martin & Chalmers, 2007). Due to this perception, many schools and school districts have cut back on physical education classes, recess, field trips and other activities that take students away from the regular classroom. In the years that these programs have been cut, schools have seen behavior problems, attention disorders, disinterest in schools and drop-out rates increase. Several studies have been done that indicate that students' academic performance was not negatively affected when schools devoted more instructional time to physical activity, even though the time allocated to other subjects was concomitantly reduced (Ahamed, Macdonald, Reed, Naylor, Liu-Ambrose, & McKay, 2007; Coe, Pivarnick, Womack, Reeves, & Malina, 2006; Sallis, McKenzie, Kolody, Lewis, Marshall, & Rosengard, 1999; Trost & van der Mars, 2010; Trudeau & Shepard, 2008). Key findings of these studies are summarized in Table 1. Table 2 presents four major studies that indicated that academic achievements were positively affected by physical education.

Table 1

Physical Activity: No Negative Effect on Academic Achievement

Study Authors	Location	Design	Participants	Time Spent on Physical Activity	Outcome measurement	Results
Dwyer, Coonan, Leitch, Hetzel, & Baghurst, 1983	Australia	Quasi-Experimental	350 5 th graders	Increased from 30 to 210 minutes per week	Arithmetic and reading tests	After 14 weeks, no significant difference in academic scores
Sallis et al., 1999	California	Quasi-Experimental	7 elementary schools	Doubled time spent in physical education	Metropolitan Achievement Tests	After 2 years, academics were not adversely affected
Coe et al., 2006	Michigan	Quasi-Experimental	214 6 th graders	55 minutes per day of physical education for one semester	Classroom assessments and nationally standardized achievement scores	No change in academic performance. Both groups performed well in mathematics, science, and English.
Ahamed et al., 2007	British Columbia	Quasi-Experimental	287 4 th and 5 th graders	Added 47 minutes per day in physical activity for 16 months	Canadian Achievement Test	Standardized test scores were equivalent to control schools.

Table 2.

Physical Activity Positive Effect on Academic Achievement

Study Authors	Location	Design	Participants	Time Spent on Physical Activity	Outcome Measurement	Results
Nelson & Gordon-Larsen, 2006	US National Longitudinal Study of Adolescent Health	Cross-sectional	11,957 students in grades 7 th through 12 th	Self-reported variables	Self-reported most recent grades in math and English	Students that were engaged in increased physical activity reported improved performance (RR=1.2 and 1.21)
Shephard, Volle, Lavalle, LeBarre, Jequier, & Rajic (as reported in Trudea & Shephard, 2008)	Quebec	Quasi Experimental	546 elementary school students	One additional hour of physical education per day	Performance on provincial standardized tests	Higher academic performance in mathematics despite removing 33 minutes of instructional time in mathematics in the intervention group
Tremarche, Robinson, & Graham, 2007	Massachusetts	Quasi Experimental	311 4 th graders	56 or more hours of physical education per school year	Massachusetts' Standardized test	Shepard, Pitado & Bean
Carlson et al., 2008	US, National Study	Cross-sectional	5,316 kindergarten through 5 th grade students	70 or more minutes per week of physical education	Mathematics and reading tests developed by the National Center for Education Statistics	Only girls had higher academic scores in mathematics.

Mechanisms for Effect of Physical Activity on Academic Performance

There are a number of explanations for the effect physical activity has on academic performance. Research has shown that regular exercise can alleviate stress, anxiety and depression, and boost self-esteem. All of these are problems that have the potential to adversely affect school performance (Vail, 2006). There is also evidence that increases in physical activity levels can have an effect on classroom behavior by decreasing disruptive behaviors. A study in South Australia took 500 students and added 1.25 hours per day of endurance fitness. The two-year follow-up showed trends toward better grades in reading and mathematics as well as a decrease in the time teachers spent correcting student behavior (Trudeau & Shephard, 2008). Additionally, studies have also suggested that students who participate in extracurricular activities have better and more interaction adults in their lives and had a higher level of school satisfaction and school connectedness (Brown & Evans, 2002). Finally, increased physical activity may have an effect on cognitive and motor skill development (Martin & Chalmers, 2007). The positive relationship between academics and physical activity could be that students who are motivated in one area are more likely to strive to be successful in other areas. Emerging evidence suggests that physical activity may promote the growth of new brain cells, stimulate blood vessels in the brain, and enhance the communication among brain cells (Troost & Mars, 2010).

Conclusion

Physical activity has a positive effect on health outcomes, both physical and psychological (American Heart Association, 2010; Siegel, 2006), and evidence suggests that it may have a positive effect on academic performance (Trudeau & Shephard, 2008). However, there are barriers to increasing physical activity in schools. First, gaining administrative and government support for school health programs can be difficult considering the pressure that local leaders face to improve academic performance on standardized tests. (Symons, 1997) physical education programs are not often seen as a primary concern to these administrators, since many believe that student health is not of concern to schools but should be an issue that parents address (Symons, 1997). Second, budget constraints are frequently cited as reasons for cut backs on health and physical education, especially in low-income areas (Symons, 1997). Finally, the research on physical education and student performance is also not very consistent. Some studies that show no significant relationship or a very weak relationship between student academic performance with increased physical activity levels (Taras, 2005), although that same evidence suggests that although increasing time spent on physical activity does not adversely affect academic performance (Troost & van der Mars, 2010). The weak correlation often observed between physical activity and

academic performance measures may be also due to due to the short-term nature of many studies (Murray, Low, Hollis, Cross, & Davis, 2007). Increases in physical activity over longer periods of time may be more likely to enhance academic achievement (Taras, 2005). Taras also proposes that it is possible that the positive effects of increased physical activity exist primarily in certain sub-populations of students such as those students who are low-achieving or who have lower levels of physical fitness. Whether daily physical activity has a direct or indirect positive effect on academic achievement or whether the effect is great or small, physical education is crucial in promoting and increasing physical activity in children and youth (Trost & van der Mars, 2010). Increasing physical activity levels may have a win/win effect on students' health and academic performance. At worst, it will have a win/break even effect.

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