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A STUDY ON PERFORMANCE OF SPORTS ACTIVITY EVIDENCE IN PHYSICAL & MENTAL HEALTH IN SPORTS EDUCATION AND MANAGEMENT

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ABSTRACT

The Sports Activity is an major important role port of our human Life. The Health is very important for every living organisms in the real world. The WHO suggests that increasing physical activity and physical fitness may improve academic performance and that time in the school day dedicated to recess, physical education class, and physical activity in the classroom may also facilitate academic performance.Available evidence suggests that mathematics and reading are the academic topics that are most influenced by physical activity. These topics depend on efficient and effective executive function, which has been linked to physical activity and physical fitness. Executive function and brain health underlie academic performance. Basic cognitive functions related to attention and memory facilitates learning, and these functions are enhanced by physical activity and higher aerobic fitness.

Key Words : Fitness , Sports Activity, WHO etc

INTRODUCTION

The Essential of Sports activity and mental health is empirically supported and well accepted (Basch, 2010), and multiple studies have confirmed that health benefits are associated with physical activity, including cardiovascular and muscular fitness, to evaluate the life style of the human life with healthy environment includes bone health, psychosocial outcomes, and cognitive and brain health (Strong et al., 2005; see Chapter 3). The relationship of physical activity and physical fitness to cognitive and brain health and to academic performance is the subject of this chapter.

Given that the brain is responsible for both mental processes and physical actions of the human body, brain health is important across the life span. In adults, brain health, representing absence of disease and optimal structure and function, is measured in terms of quality of life and effective functioning in activities of daily living. In children, brain health can be measured in terms of successful development of attention, on-task behavior, memory, and academic performance in an educational setting. This chapter reviews the findings of recent research regarding the contribution of engagement in physical activity and the attainment of a health-enhancing level of physical fitness to cognitive and brain health in children. Correlational research examining the relationship among academic performance, physical fitness, and physical activity also is described. Because research in older adults has served as a model for understanding the effects of physical activity and fitness on the developing brain during childhood, the adult research is briefly discussed. The short- and long-term cognitive benefits of both a single session of and regular participation in physical activity are summarized.

Before outlining the health benefits of physical activity and fitness, it is important to note that many factors influence academic performance. Among these are socioeconomic status (Sirin, 2005), parental involvement (Fan and Chen, 2001), and a host of other demographic factors. A valuable predictor of student academic performance is a parent having clear expectations for the child's academic success. Attendance is another factor confirmed as having a significant impact on academic performance (Stanca, 2006; Baxter et al., 2011). Because children must be present to learn the desired content, attendance should be measured in considering factors related to academic performance.

Physical Fitness And Physical Activity: Relation To Academic Performance

State-mandated academic achievement testing has had the unintended consequence of reducing opportunities for children to be physically active during the school day and beyond. In addition to a general shifting of time in school away from physical education to allow for more time on academic subjects, some children are withheld from physical education classes or recess to participate in remedial or enriched learning experiences designed to increase academic performance (Pellegrini and Bohn, 2005; see Chapter 5). Todays environment which consists of hygenie food and healthy atmosphere is a challenge to face in our life. Yet little evidence supports the notion that more time allocated to subject matter will translate into better test scores. Indeed, 11 of 14 correlational studies of physical activity during the school day demonstrate a positive relationship to academic performance (Rasberry et al., 2011). Overall, a rapidly growing body of work suggests that time spent engaged in physical activity is related not only to a healthier body but also to a healthier mind (Hillman et al., 2008).

Children respond faster and with greater accuracy to a variety of cognitive tasks after participating in a session of physical activity (Tomporowski, 2003; Budde et al., 2008; Hillman et al., 2009; Pesce et al., 2009; Ellemberg and St-Louis-Deschênes, 2010). A single bout of moderate-intensity physical activity has been found to increase neural and behavioral concomitants associated with the allocation of attention to a specific cognitive task (Hillman et al., 2009; Pontifex et al., 2012). And when children who participated in 30 minutes of aerobic physical activity were compared with children who watched television for the same amount of time, the former children cognitively outperformed the latter (Ellemberg and St-Louis-Desêhenes, 2010). Visual task switching data among 69 overweight and inactive children did not show differences between cognitive performance after treadmill walking and sitting (Tomporowski et al., 2008b).

When physical activity is used as a break from academic learning time, postengagement effects include better attention (Grieco et al., 2009; Bartholomew and Jowers, 2011), increased on-task behaviors (Mahar et al., 2006), and improved academic performance (Donnelly and Lambourne, 2011). Comparisons between 1st-grade students housed in a classroom with stand-sit desks where the child could stand at his/her discretion and in classrooms containing traditional furniture showed that the former children were highly likely to stand, thus expending significantly more energy than those who were seated (Benden et al., 2011). More important, teachers can offer physical activity breaks as part of a supplemental curriculum or simply as a way to reset student attention during a lesson (Kibbe et al., 2011; see Chapter 6) and when provided with minimal training can efficaciously produce vigorous or moderate energy expenditure in students (Stewart et al., 2004). Further, after-school physical activity programs have demonstrated the ability to improve cardiovascular endurance, and this increase in aerobic fitness has been shown to mediate improvements in academic performance (Fredericks et al., 2006), as well as the allocation of neural resources underlying performance on a working memory task (Kamijo et al., 2011).

Over the past three decades, several reviews and meta-analyses have described the relationship among physical fitness, physical activity, and cognition (broadly defined as all mental processes). The majority of these reviews have focused on the relationship between academic performance and physical fitness—a physiological trait commonly defined in terms of cardiorespiratory capacity (e.g., maximal oxygen consumption; see Chapter 3). More recently, reviews have attempted to describe the effects of an acute or single bout of physical activity, as a behavior, on academic performance. These reviews have focused on brain health in older adults (Colcombe and Kramer, 2003), as well as the effects of acute physical activity on cognition in adults (Tomporowski, 2003). Some have considered age as part of the analysis (Etnier et al., 1997, 2006). Reviews focusing on research conducted in children (Sibley and Etnier, 2003) have examined the relationship among physical activity, participation in sports, and academic performance (Trudeau and Shephard, 2008, 2010; Singh et al., 2012); physical activity and mental and cognitive health (Biddle and Asare, 2011); and physical activity, nutrition, and academic performance (Burkhalter and Hillman, 2011). The findings of most of these reviews align with the conclusions presented in a meta-analytic review conducted by Fedewa and Ahn (2011). The studies reviewed by Fedewa and Ahn include experimental/quasi-experimental as well as cross-sectional and correlational designs, with the experimental designs yielding the highest effect sizes. The strongest relationships were found between

aerobic fitness and achievement in mathematics, followed by IQ and reading performance. The range of cognitive performance measures, participant characteristics, and types of research design all mediated the relationship among physical activity, fitness, and academic performance. With regard to physical activity interventions, which were carried out both within and beyond the school day, those involving small groups of peers (around 10 youth of a similar age) were associated with the greatest gains in academic performance.

Physical Fitness as a Learning Outcome of Physical Education and Its Relation to Academic Performance

Achieving and maintaining a healthy level of aerobic fitness, as defined using criterion-referenced standards from the National Health and Nutrition Examination Survey (NHANES; Welk et al., 2011), is a desired learning outcome of physical education programming. Regular participation in physical activity also is a national learning standard for physical education, a standard intended to facilitate the establishment of habitual and meaningful engagement in physical activity (NASPE, 2004). Yet although physical fitness and participation in physical activity are established as learning outcomes in all 50 states, there is little evidence to suggest that children actually achieve and maintain these standards (see Chapter 2).

Statewide and national datasets containing data on youth physical fitness and academic performance have increased access to student-level data on this subject (Grissom, 2005; Cottrell et al., 2007; Carlson et al., 2008; Chomitz et al., 2008; Wittberg et al., 2010; Van Dusen et al., 2011). Early research in South Australia focused on quantifying the benefits of physical activity and physical education during the school day; the benefits noted included increased physical fitness, decreased body fat, and reduced risk for cardiovascular disease Even today, Dwyer and colleagues are among the few scholars who regularly include in their research measures of physical activity intensity in the school environment, which is believed to be a key reason why they are able to report differentiated effects of different intensities. A longitudinal study in Trois-Rivières, Québec, Canada, tracked how the academic performance of children from grades 1 through 6 was related to student health, motor skills, and time spent in physical education. The researchers concluded that additional time dedicated to physical education did not inhibit academic performance

Physical Activity, Physical Education, and Academic Performance

In contrast with the correlational data presented above for physical fitness, more information is needed on the direct effects of participation in physical activity programming and physical education classes on academic performance.

In a meta-analysis, Sibley and Etnier (2003) found a positive relationship between physical activity and cognition in school-age youth (aged 4-18), suggesting that physical activity, as well as physical fitness, may be related to cognitive outcomes during development. Participation in physical activity was related to cognitive performance in eight measurement categories (perceptual skills, IQ, achievement, verbal tests, mathematics tests, memory, developmental level/academic readiness, and "other"), with results indicating a beneficial relationship of physical activity to all cognitive outcomes except memory (Sibley and Etnier, 2003). Since that meta-analysis, however, several papers have reported robust relationships between aerobic fitness and different aspects of memory in children (e.g., Chaddock et al., 2010a, 2011; Kamijo et al., 2011; Monti et al., 2012). Regardless, the comprehensive review of Sibley and Etnier (2003) was important because it helped bring attention to an emerging literature suggesting that physical activity may benefit cognitive development even as it also demonstrated the need for further study to better understand the multifaceted relationship between physical activity and cognitive and brain health.

The regular engagement in physical activity achieved during physical education programming can also be related to academic performance, especially when the class is taught by a physical education teacher. The Sports, Play, and Active Recreation for Kids (SPARK) study examined the effects of a 2-year health-related physical education program on academic performance in children (Sallis et al., 1999). In an experimental design, seven elementary schools were randomly assigned to one of three conditions: (1) a specialist condition in which certified physical education teachers delivered the SPARK curriculum, (2) a trained-teacher condition in which classroom teachers implemented the curriculum, and (3) a control condition in which classroom teachers implemented the local physical education curriculum. No significant differences by condition were found for mathematics testing; however, reading scores were significantly higher in the specialist condition relative to the control condition (Sallis et al., 1999), while language scores were significantly lower in the specialist condition than in the other two conditions. The authors conclude that spending time in physical education with a specialist did not have a negative effect on academic performance. Shortcomings of this research include the amount of

data loss from pre- to posttest, the use of results of 2nd-grade testing that exceeded the national average in performance as baseline data, and the use of norm-referenced rather than criterion-based testing.

In seminal research conducted by Gabbard and Barton (1979), six different conditions of physical activity (no activity; 20, 30, 40, and 50 minutes; and posttest no activity) were completed by 106 2nd graders during physical education. Each physical activity session was followed by 5 minutes of rest and the completion of 36 math problems. The authors found a potential threshold effect whereby only the 50-minute condition improved mathematical performance, with no differences by gender.

Single Bouts of Physical Activity

Beyond formal physical education, evidence suggests that multi-component approaches are a viable means of providing physical activity opportunities for children across the school curriculum (see also Chapter 6). Although health-related fitness lessons taught by certified physical education teachers result in greater student fitness gains relative to such lessons taught by other teachers (Sallis et al., 1999), non-physical education teachers are capable of providing opportunities to be physically active within the classroom (Kibbe et al., 2011). Single sessions or bouts of physical activity have independent merit, offering immediate benefits that can enhance the learning experience. Studies have found that single bouts of physical activity result in improved attention (Hillman et al., 2003, 2009; Pontifex et al., 2012), better working memory (Pontifex et al., 2009), and increased academic learning time and reduced off-task behaviors (Mahar et al., 2006; Bartholomew and Jowers, 2011). Yet single bouts of physical activity have differential effects, as very vigorous exercise has been associated with cognitive fatigue and even cognitive decline in adults (Tomporowski, 2003). As seen in Figure 4-1, high levels of effort, arousal, or activation can influence perception, decision making, response preparation, and actual response. For discussion of the underlying constructs and differential effects of single bouts of physical activity on cognitive performance, see Tomporowski (2003).

Developing the Brain Activity with Mental Health

The study of brain health has grown beyond simply measuring behavioral outcomes such as task performance and reaction time (e.g., cognitive processing speed). New technology has emerged that has allowed scientists to understand the impact of lifestyle factors on the brain from the body systems level down to the molecular level. A greater understanding of the cognitive components that subserve academic performance and may be amenable to intervention has thereby been gained. Research conducted in both laboratory and field settings has helped define this line of inquiry and identify some preliminary underlying mechanisms.

Relationship of Physical Activity to Brain Health and Cognition in Older Adults

Despite the current focus on the relationship of physical activity to cognitive development, the evidence base is larger on the association of physical activity with brain health and cognition during aging. Much can be learned about how physical activity affects childhood cognition and scholastic achievement through this work. Despite earlier investigations into the relationship of physical activity to cognitive aging (see Etnier et al., 1997, for a review), the field was shaped by the findings of Kramer and colleagues (1999), who examined the effects of aerobic fitness training on older adults using a randomized controlled design. Specifically, 124 older adults aged 60 and 75 were randomly assigned to a 6-month intervention of either walking (i.e., aerobic training) or flexibility (i.e., nonaerobic) training. The walking group but not the flexibility group showed improved cognitive performance, measured as a shorter response time to the presented stimulus. Results from a series of tasks that tapped different aspects of cognitive control indicated that engagement in physical activity is a beneficial means of combating cognitive aging (Kramer et al., 1999).

Cognitive control, or executive control, is involved in the selection, scheduling, and coordination of computational processes underlying perception, memory, and goal-directed action. These processes allow for the optimization of behavioral interactions within the environment through flexible modulation of the ability to control attention (MacDonald et al., 2000; Botvinick et al., 2001). Core cognitive processes that make up cognitive control or executive control include inhibition, working memory, and cognitive flexibility (Diamond, 2006), processes mediated by networks that involve the prefrontal cortex. Inhibition (or inhibitory control) refers to the ability to override a strong internal or external pull so as to act appropriately within the demands imposed by the environment (Davidson et al., 2006). For example, one exerts inhibitory control when one stops speaking when the teacher begins lecturing. Working memory refers to the ability to represent information mentally, manipulate stored information, and act on the information (Davidson et al., 2006). In solving a difficult mathematical problem, for example, one must often remember the remainder. Finally, cognitive flexibility refers

to the ability to switch perspectives, focus attention, and adapt behavior quickly and flexibly for the purposes of goal-directed action (Blair et al., 2005; Davidson et al., 2006; Diamond, 2006). For example, one must shift attention from the teacher who is teaching a lesson to one's notes to write down information for later study.

CONCLUSION

The strongest relationships have been found between aerobic fitness and performance in mathematics, reading, and English. For children in a school setting, regular participation in physical activity is particularly beneficial with respect to tasks that require working memory and problem solving. These findings are corroborated by the results of both authentic correlational studies and experimental randomized controlled trials. Overall, the benefits of additional time dedicated to physical education and other physical activity opportunities before, during, and after school outweigh the benefits of exclusive utilization of school time for academic learning, as physical activity opportunities offered across the curriculum do not inhibit academic performance.

Both habitual and single bouts of physical activity contribute to enhanced academic performance. Findings indicate a robust relationship of acute exercise to increased attention, with evidence emerging for a relationship between participation in physical activity and disciplinary behaviors, time on task, and academic performance. Specifically, higher-fit children allocate greater resources to a given task and demonstrate less reliance on environmental cues or teacher prompting.

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