The Impact of Physical Education/Activity and Motor Development on Academic Achievement

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Abstract

It is imperative to understand the importance of physical education/activity in the daily lives of children. Obesity is an increasing problem in society today, yet physical education in schools is being cut to make room for more “academics.” Research shows a correlation between physical education/activity and motor development on academic achievement. Although it is still unclear how strong this correlation is, it is clear physical education/activity does not hinder students’ grades. National Physical Education standards and the surgeon general have advised schools across the country to follow the recommendations of daily high quality physical education for all K-12 students.
Chapter I

Introduction

General educators and parents need to understand the importance of physical activity/development and the role it plays in the cognitive learning process as well as how it affects the academic achievement of students. Children should be encouraged all throughout their lives to move. Movement can encourage health and hobbies, along with increased motor development. Can this activity affect their academics? Many people think that physical development only affects physical aspects. However, here is some research that suggests physical activity has a positive impact on academic learning.

Statement of the Problem

The philosopher Spinoza once said, “Teach the body to do many things; this will help you perfect the mind and come to the intellectual level of thought” (Learner & Kline, 2006, p. 231). Throughout history, many philosophers have written about the relationship of physical activity/motor development and learning, along with placing a high level of importance on physical development. Philosophers believed the soul was developed by the mind, as well as the body (Learner & Kline, 2006). However, society has lost the importance of physical activity and forgotten the crucial role it plays in children’s motor development as well as academic achievement. Over the last twenty years according to the American Academy of Pediatrics childhood obesity has doubled (Cull, 2006). Obesity has become the greatest health risk to children and adolescents today. Children are spending an average of five to six hours a day doing sedentary activities like playing video games, watching television, and using the computer (Dietz & Gortmaker, 1985). With childhood obesity rapidly rising each day in America, it is clear children are not developing good physical activity habits. The reduction in
physical activity as children mature is contributing to the rise in adult obesity (Tlama, Yang, Laakso, & Vilkari, 1997). Children should be getting daily physical activity in school through quality physical education programs because of the health benefits. However, for many years, physical education has had a negative stigma attached to it and the public has viewed it as “leisure time,” “recess time,” “game time,” or just “sport class” (Guedes, 2007, p. 31). Under the Bush administration, Congress implemented No Child Left Behind (NCLB), which increased the importance on core subjects in schools (math, science, literacy/English etc.) and reduced the importance on subjects like PE, art and music, or the “extra subjects.” With the pressure to meet standards, schools have cut physical education programs to make more time for learning math and language arts (Siegel, 2008). We know about the health benefits of physical education and activity, but what about the impact physical education/activity and motor development can have on the academic achievement of America’s students?

Research Questions

The need for encouraging daily physical activity for students’ is obvious. Children across the country are supporting sedentary lifestyles because of rising academic demands, television and video games. What are the effects of physical activity/education on students’ academic achievement?

It is also important to think about how motor development at a young age can affect learning throughout the years. What are the implications of parental guidance of children’s motor development of young learners?

Definition of Terms

Physical Education- “instruction in the development and care of the body ranging from simple
callisthenic exercises to a course of study providing training in hygiene, gymnastics, and the performance and management of athletic games” (Merriam-Webster Dictionary, 2009, online).

Physical Activity- “term that refers to any expenditure of energy brought about by bodily movement via the skeletal muscles; as such, it includes the complete spectrum of activity from very low resting levels to maximal exertion” (Encyclopedia Britannica, 2009).

Academic Achievement- increased grades in core academic classes, or increasing tests scores on standardized tests (Podulka, Pivarnik, Womack, Reeves and Malina, 2006, p. 1).

Motor development- a field of study concerning the changes in the principle of human skilled movement generated at a behavioral level occurring as a result of growth, maturation and experience (Schmidt & Lee, 1999, p. 416)

Cognitive Abilities/development- Clusters of human abilities that enable one to know, be aware, think conceptualize, reason, criticize and use abstractions (Lerner & Kline, 2006, p. G2)

Gross Motor skills- Involve the development of large muscles involved in moving the arms, legs, torso, hands and feet. Skills could be walking, jumping, hopping, running, skipping, throwing, and catching (Lerner & Kline, 2006, p. 230).

Fine motor skills- Involve the development of muscles used to move fingers and wrists, as well as eye-hand coordination of the two hands. Skills could include learning to eat with utensils, dress themselves, using buttons and zipper, and using pencils and crayons (Lerner & Kline, 2006, p. 230).
Fitnessgram- a physical education test, testing students in six areas of fitness standards: aerobic capacity, body composition, curl-ups, trunk lifts, upper body strength and flexibility (Siegel, 2006).

Body Mass Index- “A measurement of the relative percentages of fat and muscle mass in the human body, the BMI is an indicator of obesity” (Vail, 2006, p. 16).

Brain Gym- Developed in 1970 by Dr. Paul Dennison and Gail Dennison, it is a set of 26 movement activates such as crawling, drawing, tracing symbols in the air, yawning etc. that are targeted to integrate the body and the mind to bring rapid and dramatic improvements in: concentration, memory, reading, writing, organization, listening, physical coordination and more. It is said to develop the neural pathways naturally, through movement. Originally developed to help children with Learning Disabilities learn more effectively (www.skepdic.com).
As previously stated, schools are placing less and less importance on physical education (Guedes, 2007; Tlama, Yang, Laakso, & Vilkari, 1997). However, researchers suggest this mistake could hinder the academic achievement of students. In a recent study by the California Department of Education, Blakemore (2003) suggested, “Movement can be an indispensable part to learning and thinking, as well as an integral part of mental processing” (p. 22). The study was done on 884,715 fifth, seventh and ninth grade students in California, in 2002. The study looked at the correlation of Fitnessgram scores with the Stanford Achievement Test (SAT) scores in reading and math. Since the SAT is a state mandated test students did not volunteer for the study, their results from the two above test were automatically compared. The study of middle and high school students had four conclusions: (1) there was a correlation between higher SAT scores and higher levels of fitness. (2) There was greater correlation between academic achievement and fitness in mathematics, particularly at higher fitness levels. (3) Students who met minimum fitness levels in numerous areas showed the greatest academic gains. (4) Females showed higher academic achievement than males showed (Blakemore, 2003).

Siegel (2006) looked at the same study from the California Department of Education but stated he could not determine causality by just comparing SAT scores and the number of fitness standards achieved on the Fitnessgram. Other variables could have had an effect on the results. For instance higher socioeconomic status is usually associated with better health. In his conclusion, he mentioned, even with the consideration of these issues, the data from the
study does not show that physical fitness causes academic achievement to improve but that physical education could promote good health, and good health is a requirement for success in many areas. Due to the conclusions of these authors and this study the California State Superintendent of Public Instruction, Eastin, stated: “This statewide study provides compelling evidence that the physical well-being of students has a direct impact on their ability to achieve academically…students achieve best when they are physically fit..” (CDE, 2002, p. 1).

Other research tried to conclude similar results. Physical education and activity can have an impact on academic achievement (Carlson, Fulton, Lee, Maynard, Brown, Kohl, & Dietz, 2008). Researchers examined the association between time spent in physical education, and academic achievement. The research study was done on a nationally representative sample of 5,316 kindergarten students, and looked at time spent in physical education (minutes per week) compared to math and reading scores. An item response theory scale was used for scoring. A small benefit for academic achievement was seen in girls in math and reading who engaged in higher amounts (70-300 minutes per week) of physical education. Higher amounts of physical education were not positively or negatively associated with boys. The study does not show that physical education/activity caused an increase in academic achievement but does show a correlation in higher test scores and more time in physical education (Carlson, et al., 2008).

Castelli and Hillman (2006) also discussed the impact physical activity could have on academic achievement. Fitness scores were compared with accomplishment on seven different cognitive tasks of 239 third and fifth graders from four Illinois elementary schools. Math and reading scores from the Illinois standard achievement test were compared to fitness
scores as well as comparing how well they preformed on five different un-named cognitive
tasks. A strong relationship was shown between higher aerobic fitness and math ability, as
well as higher Body Mass Indexes (BMI) being associated with lower academic achievement.
These results held true no matter the student’s gender, age or socioeconomic status. The
results did not show causation, that more time in PE caused an increase in academic
achievement but merely causation. However, Castelli and Hillman still concluded by saying,
“It’s common sense. We think that children who are healthier and more active are more ready
to learn. If you have a higher BMI, you’re not as prepared to learn” (Vail, 2006, p.16).

An Atlanta, GA a study on 163 overweight school children concluded similar results. A
cross-disciplinary research team assigned the children randomly to one of three groups. One
group was the control, receiving no special exercise sessions, another group received 20
minutes of after school activity each day, and another received 40 minutes of daily physical
activity. After 14 weeks, the group receiving 40 minutes had the highest scores on
standardized academic tests and a test measuring their thinking process, which involves
planning, organizing, abstract thought and self-control. The group receiving 20 minutes of
exercise had half the gains of the group receiving 40 minutes of exercise daily. The author of
the study concluded that the results were outstanding and extremely surprising. She stated that
this study provided strong evidence for causation. The results of this study show strong
evidence that physical education/activity do impact academic achievement rather than just a
small correlation (Viadero, 2008).

A study done in Massachusetts determined students scored higher on standardized
testing with more hours of quality physical education. Two schools were used in this
experiment and 311 fourth-grade students participated. The authors analyzed the means of the
standardized test scores from the Massachusetts Comprehensive Assessment System tests (MCAS) and their scores in math and English and Language Arts (ELA) compared to time in physical education. Each school had different hours of PE, one school with 28 hours of PE in two months and the other with 56 hours of PE in that period. An independent t-test was used to determine if a significant difference existed between the two schools. Again the results indicated a large difference between the means of the two groups in ELA. Those receiving more physical education had a noteworthy increase in their test scores in ELA. The authors suggested that those who receive more house of PE per day can score higher on certain subject areas of the MCAS test. And advised schools to remember how important it is to include quality physical education programs in a student’s educational plan (Tremarche, Robinson & Graham, 2007).

The American College of Sports Medicine revealed that participation in vigorous physical activity was the key to improved academic performance: grades were not effected in children who were only moderately active for 30 minutes at least five times a week. Researchers took 214 middle school students and randomly assigned them to a PE course for one semester for the year. Physical activity in and out of school were measured in 30 minute blocks and compared to their grades in core academic subjects (math, English, science, and world studies). “Enrollment in PE classes alone favorably influenced grades, but the highest academic achievers in the study were those who participated in a sport or other vigorous activity at least three times a week” (ACMS, 2006, p. 740).

Another study helped show a correlation with academic achievement and physical education/activity as well as PE positively affecting other areas. Eighty-nine high school seniors completed a 181-item Likert-type questionnaire on behavior and psychological
attitudes of their young lives. Exercise was also assessed on this 5-point scale. The results reported not only determined a correlation between physical education/activity and academic achievement. Those who reported high levels of exercise also had better relationships with parents, more family support, less depression, a lower level of drug use, and higher grade point averages than those who reported low levels to no exercise. Researchers concluded that these results only suggest that exercise is a positive activity for adolescents, not necessarily the cause of academic achievement (Field, Diego, & Sanders, 2001).

Deary (2006) looked at how the physical shape of older adults affected their cognitive function. The study from Scotland and France was done on scouts’ cognitive function at age 11 in 1932. They were tested again almost 70 years later. The results concluded that even seven decades later those in good physical shape had better cognitive functioning. The study published in Neurology was vague on the methods and did not take into account the most obvious variable, maturation. However, Deary concluded, “The important result of the study was, fitness contributes to better cognitive ability in old age. Thus, two people starting out with the same IQ at age 11, the fitter person at age 79 will, on average, have better cognitive function” (Deary, 2006, pg. 1).

Brain Gym

This literature review has discussed how exercise and physical education affects learning, lets now discuss how a particular series of movements, called Brain Gym, can affect the academic achievement of students. This popular commercial program has been marketed to schools across the world with the claim on their website being “Learn ANYTHING faster and more easily.” Little research has been done on the claims of Brain Gym; however,
research presented below is not favorable to these claims (Hyatt, 2007).

One study by Khalsa and Sift in 1991 with 60 college students, tested response time to two different visual stimuli to see if response time could be shortened after a Brain Gym intervention. Pre and post-test measures of response time were compared. The participants were divided into three groups, one looking at re-pattern stimuli, another at movement and one group served as the control. The results indicated the main effect decreased response time, greatest with the re-pattern group, followed by the movement and the control group. In the end the authors said this could not be due to the intervention because they did not determine if there were differences in reaction time of the groups prior to the intervention. Due to the unreliable testing methods, the minimal descriptions of the procedures and treats to validity in this study it is not considered a reasonable resource to support Brain Gyms claims.

Cammisa (1994) looked at if a year of Brain Gym activities has a positive effect on perceptual motor skills and academic achievement. The study consisted of 25 school-aged students of varying ages, who served as their own control, performing un-specified Brain Gym activities for a year. This study had obvious flaws. The specific Brain Gym movements that were done were not named as well as the frequency at which they were done. There was also not a control group in the study. In the conclusion, the author noted, any positive effects on motor skills seen could not be solely related to Brain Gym activities, because maturation was not controlled. The authors also noted that Brain Gym activities had no impact on academic achievement.

De los Santos (2002) examined the affects Brain Gym had on student success. Two predominantly Hispanic schools were studied, school one was the experimental group with
390 students K-12 listening to Mozart during the day and doing Brain Gym activities. The control school had 596 students K-12 participants, doing their regular activities throughout the day. Even though the study was done on elementary students, the results were applied to college-aged students and the same results inferred. It is unreliable to do research on one group and infer the results on another group. The conclusion stated there was an increase in academic success of the students who used Brain Gym. However, the final measurements were made only using the teacher ratings of the students. The threats to validity of this test were not controlled. In the articles conclusion, the recommendation was to use Brain Gym prior to testing with the purpose of increasing scores even though the study was done on elementary students and then recommended to college age students with no proper documentation.

The research presented her on Brain Gym is not favorable for the claims they have made. It is reasonable to assume that little is known about Brain Gym and the movements used and just how they affect learning. No correlation is represented through these inconclusive research studies.

*No Impact on Achievement?*

Much research has shown a correlation between physical education and increases academic achievement. But is there research that does not support this correlation? A recent study by Podulka, Pivarnik, Womack, Reeves and Malina (2006) reported those enrolled in physical education did not show higher academic achievement than those who were not enrolled in daily physical education. Two hundred-fourteen volunteer sixth-grade students were either enrolled in physical education first or second semester. Their time spent in PE was
compared to achievement. When students were enrolled in PE their academic achievement (combined test scores) was not affected. Nevertheless, they did discover those who participated in vigorous physical activity recorded higher grades. These researchers suggested that daily physical activity could stimulate students’ performance, which could help boost attention and concentration, which leads to better academic performance. When students were enrolled in physical education there was no indication of improved academic performance; however, there was also no decrease in academic performance compared to students who had an additional hour of academic instruction each day.

Another study in California introduced a curriculum to fourth and fifth-grade students known as the Sports, Play, and Active Recreation for Kids, or SPARK program, concluded similar results. Twelve public elementary schools in southern California participated in the study. Approximately 1,538 fifth grade students participated in pre, middle and post testing in academics as well as physical education. The findings revealed spending more time in physical education had no harmful effects on the academic achievement of students. In conclusion, researchers encouraged school administrators to provide more time for health related physical education programs because of the physical and mental health benefits to students (Sallis, McKenzie, Kolody, Lewis, Marshall, & Rosengard, 1999).

Learning and Motor Development

This literature review looked at how physical education/activity impact learning. Research on Brain Gym has also been presented. Now the review will look at how the motor development of children affects learning.

“Movement and motor experiences are crucial for human development” (Lerner &
Kline, 2006, p. 233). In the first two years of life, a child begins the stages of recognition, understanding and thinking. All of these skills will inevitably result in different movement experiences and their consequences. Children learn from infancy the love to move, play and interact within their environment. “The human body was designed to move and its early experiences lay the foundation of what follows” (Boom, 2007, p. 2). Movement is what stimulates cognitive development. If children lack proper environmental stimuli during infancy, sensory pathways in the brain may not develop properly and the ability to utilize motor skills may remain under developed (Leppo, Davis & Crim, 2007).

In the first few years of life the area of the brain responsible for forming functional circuits develops. This is the cerebellum, which controls posture and movement. All the actions and movements that children make influence the development of the cerebellum. This movement helps the brain mature, which encourages cognitive development. “Research has suggested that the cerebellum affects spatial perception, memory, selective attention, language, handling of information and decision making” (Leppo, Davis & Crim, 2000, p. 142).

Boons’ 2007 research has shown strong links between the motor cortex and frontal lobes of the brain. When children start to think and plan their thinking, it is often object related. Planning is something we do very often and when planning to fulfill a conscious desire our brain is constantly using its neurological confections. Movement is what stimulates the assortment of connections, which in turn allows us to think beyond our original focus, thinking ‘outside of the box’ as they say. Movement when children are planning and thinking enables creativity.
Children enjoy movement and being active as they develop motor abilities. They use these skills to explore environments and stimuli around them. Movement simulates and promotes cognitive development and helps children express emotions all while offering opportunities for independence. All of these things contribute to an improved self-concept for children. Movement and movement concepts are essential to the development of a child, not to mention it promotes a healthy lifestyle forever. Teachers and parents need to understand the importance these movement skills provide. Movement skills are not automatically developed, they need to be nurtured and practiced (Leppo, Davis & Crim, 2000).

Other investigations have shown how games and motor skill development can be used to teach verbal concepts to elementary school aged children. Parts of speech, components of sentences and similar concepts can be incorporated into games for children of all ages. The incorporation of these tactfully planned games will have a measurable positive influence upon the learning process (Cratty, 1968).

**Motor Development and Those with Disabilities**

Educators and parents also need to remember to provide opportunities for children with special needs to develop fundamental motor skills according to their abilities. Movement experiences can be adapted for students with disabilities so they receive the benefits of motor development as well. Some children with disabilities show motor skills at the same level of children much younger than they are. They may have problems in areas of gross or fine motor development.

Having trouble in areas of gross motor development could include postural control, walking, running, catching and jumping. To help children in these areas and promote
development we need to provide safe areas that are free of obstacles, and as previously mentioned, modeling, encouragement, and positive interaction from parents and teachers (Lerner & Kline, 2006).

Having trouble in areas of fine motor development could include coordination of the hands and fingers and dexterity with the tongue and speech muscles. They learn these skills as they work with small objects and tools. To help children with problems on fine motor skills and help promote development they need many opportunities to work with blocks, manipulating small toys, stringing beads, buttoning and rolling or pounding (Lerner & Kline, 2006).

For young children with disabilities who are lacking in motor coordination, balance, rhythm or body image, specialized programs are designed to help them in motor skills, spatial awareness and motor planning (Lerner & Kline, 2006). You may utilize the benefits of adapted physical education teacher in your schools. If not you could seek the advice of a physical therapist or occupational therapist that works in partnership with your school district. Again, it is important to be aware of deficits you may see as a parent or an educator, and seek the advice or assistance for your specific student.

It is important to understand how motor development can affect the learning and future academic achievement of children. All throughout their lives movement can affect what they do, how the do it and at what rate they will learn. Parents and educators need to provide opportunities for children to play, move, and develop motor skills to facilitate future academic achievement.
Results and Analysis

Educators, researchers and parents know many things affect the daily lives and learning of students. Research presented here looked at one of those factors that may affect students’ lives and academic achievement, physical education/activity. Research presented in chapter one showed some correlation between physical education/activity and academic achievement (ACMS 2006; Blakemore 2003; Carlson, Fulton, Lee, Maynard, Brown, Kohl & Dietz, 2008; CDE, 2002; Tremarche, Robinson & Graham, 2007; Sanders 2007; Vail 2006; Viadero 2008). No research could identify the extent of impact of physical activity on academic achievement, but some were able to establish what areas were more affected. Three studies identified the strongest correlations were seen in math (Blakemore 2003; Carlson, Fulton, Lee, Maynard, Brown, Kohl & Dietz, 2008; CDE, 2002; Vail 2006). Two studies even identified that females were showing greater gains in areas of academic achievement than males with more physical education (Blakemore, 2003; Carlson, Fulton, Lee, Maynard, Brown, Kohl & Dietz, 2008). One researcher who studied older adults found a parallel correlation between better health and higher cognitive functioning later in life (Deary, 2006).

Brain Gym has made comparable claims to these researchers, about how its particular set of physical movements can affect learning in a positive manner. However, many have criticized these claims by the company and say there is no foundation of research to make these claims. Each of the studies presented had gaps, threats to validity and inconsistent methods; therefore, the claims of these researchers are not a reliable resource to support the claims of Brain Gym (Khalsa & Sift 1991; Cammisa 1994; De lost Santos 2002). It is
reasonable to assume that more research could give more insight and conclusive evidence of the effects of Brain Gym.

Research showing physical education/activity did not increase academic achievement was also on hand. Even though they did not see an increase in achievement in these studies, there was no decline. Therefore the conclusions of these studies were that there were no negative affects of physical education/activity on academic achievement (Podulka, Pivarnik, Womack, Reeves & Malina 2006; Sallis, McKenzie, Koldy, Lewis, Marshall & Rosengard, 1999).

Motor development and learning research has been comparable to the correlations seen between physical education/activity and academic achievement, movement is key for brain development and helps stimulate cognitive development (Boom, 2007; Cratty 1968; Learner & Kline, 2006; Leppo, Davis & Crim, 2007). They have discovered how our body movements are connected to brain development and facilitate cognitive development in young children. Two researchers also identified at all stages of our lives our brain is developing and how physical movements/activity and play encourage cognitive development (Boom, 2007; Leppo, Davis & Crim, 2007). Learner and Kline (2006) also remind how important it is not to forget about those with disabilities in providing opportunities for activity, movement and play to encourage cognitive development.

Although most of the researchers did not rule out what other factors contribute to academic achievement, the research is consistent enough to say that there are positive impacts on our health from physical education/activity, and there are no negative effects of physical activity on learning. Other founded research showed how our brain development and
cognitive development are closely related to our activity, movement and play throughout our lives. More extensive research could help show stronger connections between physical education/activity, that may provide encouraging results for physical education advocates.
Chapter IV

Recommendations

Society today has placed great academic demands on students through No Child Left Behind, stricter and stricter state graduation requirements, and increasing pressure on teachers to have students succeed in school. Still, it is the greater demands which increase an already stressful academic load and take away from the “extra” subjects like art, music and physical education, which hurts students in school. As also indicated in the introduction, childhood obesity is on the rise and needs to be considered when cutting physical education and recess in schools. It is imperative at a young age to encourage physical activity in school as well as encouraging school boards to follow the National Physical Education Association and Surgeon General recommendations, of daily physical activity for all students. It should also be stressed; this can be done without compromising academic achievement. Here are some other ideas on how movement affects us throughout our lives and contributes to our development.

Movement Throughout the Years

It is important for parents and teachers to engage children in “developmentally appropriate activities with a variety of motor components” (Leppo, Davis, & Crim, 2000, p. 143). Good movement behaviors need to be modeled for our children and students. Interacting with them during play, and encouraging and supporting various fundamental movement skills can provide positive development of motor skills. Make sure children have enough room at home and at school play areas, to crawl, walk, balance and handle objects of different sizes. Skills are enhanced by providing our children with guided practice and providing feedback to refine their skills. Remember, although some skills may be acquired
through exploration, motor development cannot be left to chance, or they may not learn essential skills (Leppo, Davis, & Crim, 2000).

“It takes 7-8 years of play and movement to provide a child with the motor intelligence that can serve as a foundation for intellectual, social and personal development. Without early intervention, children with sensory integration difficulties seldom ‘grow out of it’” (Boon, 2007, p. 4). Researchers say that children learn at least 75% of possible motor movements by the age of 12 (Leppo, Davis, & Crim, 2000).

From ages 0-2 years, children practice motor exploration. From ages 2-3 years, language functions are being localized with the right and left hemispheres of the brain. Without the assimilation that occurs during the second year of life, all following development would be inhibited. This young age also provides the integration of sensations, which helps establish relationships with others. From ages 3-7 years, high mental functioning develops and relies upon successful integration of sensory motor function. At this age children also establish fine motor skills and the ability to use tools such as scissors, knives, forks, spoons etc., are polished. From ages 8-12 years, logical elaboration occurs. Detailed and linear processing, refinement of cognitive processes and the elements of language, reading and writing skills develop, and the development of technique and linear math processing occur (Boon, 2007).

As children become older, development changes. From ages 12-16 development becomes hormonal-dependant, when adolescents learn about their bodies, self, and others. From ages 16-21, “adolescents refine cognitive skills, whole mind/body processing, social interaction, future planning and the investigation of new ideas and possibilities” (Boon, 2007,
After 21 years of age, a high level of reasoning is developed and the brain goes through elaboration and refinement. Emotions also achieve extended growth, love, compassion, altruism and further refinement of motor skills. At 30, is another growth spurt, involving further refinement of muscle movement—particularly of the hands and face.

The research is still developing, but strong correlations between the mind and body as well physical education/activity and academic achievement, show the potential benefits. School curriculums across the country must include movement activities and daily physical education. Everyone needs to be informed of the possible positive physical effects “movement” can have on child’s life. In conclusion, it is necessary that all K-12 school students have daily, quality physical education. This can be done by crossing subjects and including movement in regular classrooms as well as including “academics” in physical education. For instance a word wall for movement/sports terms to help students understand as well as develop vocabulary. In a regular geography movement could be incorporated into a game learning the 50 states and capitals. Each subject can cross their curriculum and reinforce important concepts so students can be active and retain knowledge.

Areas of Further Research

We know from research presented, it is clear there are no harmful affects of physical education/activity on academic achievement, there is not enough comprehensive research to say for sure. More research needs to be done.

A research study could start with a randomly selected state representative sample of K-12 students, the larger the sample the better, so at least 2,000. Participants would be gathered at a single location for a two month period over the summer, where students participate in
daily testing. Each day participants will engage in an academic pre-tests which are age appropriate, like tests in reading, math, writing etc. They will take the same post-test at the end of each day’s session, in the same subject as the pretest. Students will be divided into three representative groups, one being the control and receiving no physical education each day, another receiving the grade level recommended physical education each day for the two month period and the final group receiving the grade level recommended physical education for two months as well as a second session of vigorous physical activity for 45 minutes each day. All students will be tested on fitness prior to being assigned to groups. Each group will have students ranging from little fitness to very fit students. Scores from the pretest before the intervention will be directly compared to the posttest scores after the intervention. Mean score differences will be analyzed from group to group. The same scores from each subject will be compared and averaged together at the end of the week and used to establish better results on if physical education and vigorous physical activity have a direct impact on testing performance. This study will be done with no academic classes going on, just physical education in order to eliminate other variables that may affect student learning. This will also be done over a short period to eliminate maturation.

Conclusion

“Teachers and caregivers should help all children reach their intellectual, social, emotional and physical potentials. The role of movement for young children is key in meeting this challenge” (Boon, 2007, p. 147), just as Boon says it is imperative that we include motor development, physical education, and physical activity in the daily lives of children across the county. As research suggested one of the best ways include these things in the lives of children, is through vigorous developmentally appropriate physical education in schools daily.
Cutting physical education programs to increase time for core subjects is not the answer. Although the research is still ongoing about the exact effects of physical activity on learning, the benefits to daily physical activity are clear. These not only include the supporting research on the positive effects physical fitness/activity have on learning but the health benefits for inactive adolescents today. This paper cements many ideas on the importance of physical education/activity and motor development on the learning process of children today.

“Learning is a progressive, constantly changing process that serves to enrich and expand our understanding throughout life” (Boon, 2007, p. 8).
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