

ETC 690 Master Project

Benefits and Dangers of Exercise to Student Achievement

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Abstract

The growing demands of uniform assessments and social stress placed upon young individuals now compels educators to investigate the extent physical exercise helps and/or hinders student achievement and emotional well-being. This critical review of the literature examines theorists and studies that link physical fitness with academic achievement and emotional health. Results suggest that physical activity has the potential to positively impact student achievement and emotional development on a collective scale. However, research also indicates that students struggling with eating disorders or body dysmorphic disorder (BDD) do not benefit from physical exercise, but on contrary, deteriorate physically, cognitively, and emotionally as a result of over-exercise. Thus, it can be concluded that without linking physical activity to intrapersonal and interpersonal development, educators risk providing students with incomplete skills to manage academic and emotional challenges.

Introduction

The rapid curricular pace of primary and secondary classrooms may hinder teachers from examining a correlation between physical activity and a student's ability to manage academic and emotional challenges. As Core Curriculum Standards grow more demanding, compounded by a renewed emphasis on testing, the pressure to achieve at the state level can and often does overwhelm students. Academic anxiety and ultimately frustration potentially deter a child from completing assignments on schedule. Consequently, teachers at times have chosen to replace recess for prolonged periods of study. Such a protocol, while conventionally believed to increase student engagement and productivity, may actually serve the opposite purpose and hinder achievement. In the investigation on the increase of corrective reading programs for boys up to the third grade, Carla Hannaford writes that stress may serve as a primary cause that has kept such students "functioning in the brain stem and sympathetic nervous system"—areas of the mind often associated with survival instincts and not fluency (Hannaford, C., 1995, pp. 94, 133). She explains further that a "lack of movement" often inhibits "important development necessary for inner speech and formal reasoning," skills which may lead to higher cognitive thinking and the potential for academic achievement and emotional awareness (Hannaford, 1995, pp. 94).

At the same time, over-emphasis on physical fitness and body image could delay students from reaching their full potential (Levine, 2002, pp. 183-184). In some cases, patterns of over-exercise, which manifest as a result of eating disorders such as anorexia nervosa (AN) and bulimia nervosa (BN), lead to detrimental consequences that obstruct a student's capacity to succeed academically and also navigate a healthy and productive

life (Grothaus, 1998). Body dysmorphic disorder (BDD), defined as a “preoccupation with an imagined or slight physical defect of one's body,” arouses some students to engage in similar behaviors associated with eating disorders, such as disparate apprehension with bodily appearance, discontent with weight, and low self-esteem. (Merriam-Webster, 2013; Ruffolo, Phillips, Menard, Fay, & Weisberg, 2006, pp. 16). BDD, coupled with eating disorders, may produce further harmful physiological and psychological effects on the mind and body if not diagnosed and treated properly (Dingemans, Van Rood, De Groot, & Van Furth, 2012).

Rationale

Studies have found that physical exercise increases blood circulation and oxygen levels to the brain, thereby strengthening neuron connections, cellular growth, and the potential for cognitive development (Tremarche, Robinson, & Graham, 2007; Hannaford, 1995). The cultivation of neurons and deeper neuronal connections, known as dendrites, function as the catalysis for learning (Hannaford, 1995, pp. 18). Howard Gardner in his Theory of Multiple Intelligences defines bodily-kinesthetic intelligence, or physical intelligence, as a principal medium in which people learn on a continuum of levels and areas of expertise (Gardner, 1993, pp. 9). Bodily-kinesthetic intelligence, according to Gardner, represents one form of learning that allows human beings to solve problems and/or fashion products that may serve as a benefit on a personal or collective scale (Gardner, 1993, pp. 15). In conjunction, neurophysiologist Carla Hannaford explains that neurological development and “plasticity” through physical movement empower students to learn new information and even reintegrate previous knowledge in cases where the brain or body have been injured (Hannaford, 1995, pp. 17-18). Hannaford’s observations

of students classified as learning disabled and research addressing the association between movement and academic achievement support her conclusions that most young individuals possess the potential to realign neurologically by integrating movement into daily education (Hannaford, 1995, pp. 14-16).

In a study investigating the relationship between time spent in physical education (P.E.) and standardized assessments, Pamela Tremarche, Ellyn Robinson, and Louise Graham found that students who were provided more hours in P.E. also performed better in the Massachusetts Comprehensive Assessment System (MCAS) for math and language arts (Tremarche, et al., 2007). Tremarche et al. gathered their data from 311 4th graders split between two schools, comparing the number of physical education hours implemented—28 hours for School 1 and 56 hours for School 2—and test score results (Tremarche, et al., 2007, pp. 60). In the analysis of data for both schools, researchers found that the mean scores from School 2 exceeded state averages in both math and language arts while scores from School 1 fell below the same averages. The validity of such research may be called into question as a result of higher pre-existing dropout rates in School 1 (3.3%) compared to that of School 2 (1.2%) (Tremarche et al., 2007, pp. 60). A lack of information on the causality of dropout rates combined with fiscal shifts in state resources, which prompted an increase in funding for School 1 and a decrease for School 2, calls into question the socioeconomic diversity between the two schools and its effect on MCAS scores.

Still, despite such challenges to the validity of this case study, a developing trend in the research emphasizes the benefits physical exercise may have on student achievement and emotional development. Consistent physical activity has been found to

lower levels of stress and improve short term dispositions and behaviors among students at the primary and secondary levels of education, thus providing some children and adolescents with the opportunity to stay focused and at ease in the classroom (Taras, 2005, pp. 214). Howard Taras explains as a backdrop to his critical review of the literature that physical movement increases “levels of norepinephrine and endorphins,” chemicals in the brain that “induce a calming effect after exercise, and perhaps as a result improve achievement” (Taras, 2005, pp. 214). While Taras finds the long term research inconclusive, he highlights a development in the literature finding that exercise does have positive short term benefits on student achievement and social skills within a school setting.

However, prolonged exercise associated with eating disorders among children and adolescents, such as AN and BN, also exhibit potential dangers. In a critical review of the literature on compulsive eating behaviors, Kay L. Grothaus discusses how familial and cultural pressures may lead young people to harm themselves through extensive physical activity (Grothaus, 1998, pp. 146-148). Instead of providing students with an outlet to cope with academic and social concerns, Grothaus (1998) points out that extensive physical activity employed by young individuals coping with eating disorders hinders cumulative development and even in some cases proves fatal. Thus, an imperative arises from such competing perspectives to investigate and discuss how physical fitness can be implemented in our schools to further aid academic achievement while also acknowledging the societal challenges faced by a majority of students struggling with body image and weight issues.

Purpose

In this critical review of the literature, I propose to investigate the trends connecting student achievement to physical activity and emotional well-being, while also examining the potential hindrances over-exercise may pose to the cognitive and emotional development of students at the primary and secondary levels of education.

Research Question

To what extent does exercise at the primary and secondary levels of education help students manage emotional and academic challenges?

Critical Review of the Literature

Primary Theorist: Howard Gardner

Trends in the research now suggest a strong connection between the mind and body in the learning process. A correlation between physical aptitude and cumulative intelligence arises as a common theme in Howard Gardner's research. Gardner redefines intelligence as "the ability to solve problems or fashion products that are of consequence in a particular cultural setting or community" (Gardner, 1993, pp. 15). His Theory of Multiple Intelligences classifies cognitive capability into the categories of linguistic (written or oral), musical, logical/mathematical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and naturalistic intelligences—with existential intelligence acting as a

potential or “1/2” intelligence that requires further investigation (Gardner, 2011, pp. 4-9; Gardner, 1993). Interpersonal and intrapersonal intelligences, according to Gardner, address a person’s ability to recognize and experience emotions, both in a collective and independent sense (Gardner, 1993, pp. 23-25).

Gardner envisions human intellect through a continuum of skills and strengths, which he finds cannot be adequately interpreted from test scores that measure IQ—a standardized assessment of a person’s basic intelligence (Gardner, 1993, pp. 6-7). IQ tests assess mathematical achievement, short term memory dexterity, and language arts skills through a series of short answer and multiple choice questions (Encyclopedia Britannica, n.d.). To derive a person’s relative intelligence, each score within a particular age group is placed on a scale called the Bell Curve. A majority of test scores will fall within or around the median of 100 on the Bell Curve template, with a smaller number of individuals scoring below or exceeding the mid-way point of the curve.

Gardner recognizes that IQ tests will measure the potential aptitude of individuals who excel in Core Curriculum subjects such as math, science, and the language arts. While he writes that such an approach works for specific students who possess a base knowledge of the Core Curriculum, he also finds that each person holds different “cognitive strengths and contrasting styles,” which may be overlooked as a result of the structure of IQ assessments (Gardner, 1993, pp. 6). He explains that if a test does not utilize recognizable cultural materials and information that activate prior knowledge in an effective and timely manner, it will not yield accurate results on a person’s basic intelligence (Gardner, 1993). He challenges the validity of IQ assessments by comparing intelligence scores from competing international learning communities—i.e. Western and

non-Western. Gardner (1993) highlights one case in which a non-Western learning community was assessed on a Western template with Western triggers and materials to measure basic intelligence in Core Curriculum subjects. In his analysis, Gardner found that test administrators overlooked recognizable prompts necessary for creating a structure to measure the intelligence of participants in non-Western communities (Gardner, 1993, pp. 171). The diverse field of knowledge that exists from cultural to cultural and nation to nation compelled him to reason that standardized testing limits the scope of assessment to intelligences deemed imperative by Western standards, thus often neglecting the role of the remaining multiple intelligences in the learning process (Gardner, 1993).

Hannaford (1995), discussing the imperative of learning through sensory experience, supports Gardner's critique of such assessment strategies. Similar to his criticism of the Core Curriculum, she argues that the U.S. academic system "relies too much on languages as a medium of instruction" and not enough on movement oriented learning through the body, which may provide a "rich sensory and hands-on" experience (Hannaford, 1995, pp. 48-49). Unlike lectures or "two dimensional written" formats, such as short answer or multiple choice, Hannaford finds that experiences felt directly in the body help engage a student's "senses, emotions, and movements," thus allowing him or her to remember and access knowledge with greater speed and clarity (Hannaford, 1995, pp. 48-49).

In order to recognize and evaluate bodily-kinesthetic intelligence, Gardner discusses dance as a tangible product/performance that offers insight into how exercise may interconnect with musical, mathematical (the body's changing and forming shape),

spatial (a performer's use of space), interpersonal, and intrapersonal intelligences (Gardner, 2011, pp. 235-239). Gardner builds an argument that physical intelligence cannot be separated from cumulative cognitive capacity. The testimony of prominent dancers and choreographers such as Paul Taylor, Isadora Duncan, and Martha Graham provide credence to Gardner's rationale (Gardner, 2011, pp. 235-237). Instead of standing apart from linguistic and logical intelligence, physical forms such as dance act in conjunction with a variety of intelligences, helping human beings process the complexities of the mind into a more visible expression of learning and development. While discussing intrapersonal intelligence, Gardner explains, "Since this intelligence is the most private, it requires evidence from language, music, or some other more expressive form of intelligence if the observer is to detect it at work" (Gardner, 1993, pp. 25). A vocabulary known within the mind and body, often activated with music, may enable an individual to share his or her experience through the physical movement of a dance (Gardner, 2011, pp. 237).

Hannaford offers a similar point of view that the "physical/emotional link continues throughout our lives as our bodies continue to be the primary vehicle for expression of feeling" (Hannaford, 1995, pp. 58). She asks students and audiences to observe their own physical responses to music as a method of feeling the neurological connections of the mind and body and how it is played out through movement. Hannaford explains, "It is literally impossible to express emotion without motion" (Hannaford, 1995, pp. 58). She reasons that emotions felt within the body stimulate activity in the mind that can potentially benefit students on a broad continuum of intellectual and emotional skills, often times regardless of academic classifications or

diagnosis. To support her theoretical findings, Hannaford cites Antonio R. Damasio's work, which explores emotion and its impact on the development of logical intelligence and reasoning (Damasio, 1994; Hannaford, 1995, pp. 52-54). Through a series of card games played by individuals connected to polygraph machines, Damasio (1994) tracked how the feeling and expression of emotions allowed participants to learn from old mistakes and eventually learn new strategies to succeed. Rather than limiting the ability of participants to reason and learn, emotions felt, experienced, and incorporated into a repeated practice of physical awareness encouraged test subjects to make different choices as they learned the structure of the game (Damasio, 1994; Hannaford, 1995).

Consequently, Gardner (2011) and Hannaford (1995) make similar arguments that the body innately affects the cognitive and emotional intelligence of the mind. As a result of this connection, they determine that movement may function as an intermediate for expressing feelings in a manner that allows individuals to process and learn from their own experience. Whether physical activity manifests through more strenuous forms of engagement such as dance, or less vigorous methods such as feeling the emotions of the body while listening to music, Gardner (2011) and Hannaford (1995) conclude that physical intelligence can play an active part in the cumulative development of a human being.

Gardner explains that intelligence assessments should be used to inform and not classify students into competing groups—i.e. percentile rankings on the Bell Curve (Gardner, 1993, pp. 178). However, he reasons that such assessment strategies take place naturally “on the fly,” unfolding organically at the teacher's discretion (Gardner, 1993, pp. 174-175). “On the fly” implies an open-ended ambiguity that does not clearly define

how teachers will create personalized assessments that tend to the collective and individual needs of students. Due to growing classroom sizes and budgetary restrictions now felt throughout many schools and districts, an educator's affordable energy and ability to fashion assessments based on the Theory of Multiple Intelligences for students covering a broad developmental continuum challenges the strength of Gardner's critique of IQ tests. The IQ test, despite its limited scope when compared to the multiple intelligences, takes into some account the sheer volume of young scholars who make up the educational system and the need to determine ability through an economical and recognizable methodology. While individualized assessments may benefit many students and deserves further investigation for prospective integration, Gardner neglects the idea that individuals naturally function on different cognitive levels and thus possess varying degrees of "raw" ability that requires some form of measurement (Gardner, 1993, pp. 164). This is not to say that children and adolescents do not acquire knowledge, grow cognitively, and develop skills through various stages of learning, as Gardner explains through the research Piaget (Gardner, 1993, pp. 166). However, without giving some credence to the notion that students enter school with varying degrees of "raw" or innate potential, the validity of Gardner's critique could face further challenge. Gardner thus overlooks the potential benefits of utilizing standardized tests in correlation with physical fitness assessments. Although he makes a valid argument that IQ assessments disregard a variety of abilities from his theory, a negative bias toward standardized tests prohibits him from envisioning how researchers could utilize the Common Core in association with the remaining intelligences, such as bodily-kinesthetic.

Exercise and Test Scores

A growing body of research now points to a connection between test scores and physical fitness. Connie Blakemore sites a 2002 study from the California Department of Education (CDE) that examined such a relationship. In the study, researchers were able to find a correlation between SAT9 scores (reading and mathematics) and the state mandated Physical Fitness Test (PFT) for students in the 5th, 7th, and 9th grades. The PFT, utilizing the FITNESSGRAM model, tracks students' proficiency in: 1) aerobic capacity, 2) body composition, 3) muscular strength, 4) endurance, and 5) flexibility (Welk & Meredith, 2008, pp. 1-2). For proficiency in the five strength characteristics, students were required to accomplish activities in six tasks:

- Completing either the PACER test, one mile run test, or one-mile walk test to measure aerobic capacity
- Body Mass Index (BMI) score or Skinfold Test to measure body composition
- Completing the curl-up assessment to test core/abdominal strength
- Complete the Trunk Lift Test (student lies face down and lifts his or her torso) to measure lumbar flexibility (The Cooper Institute, 2007; Welk & Meredith, 2008, pp. 11-5)
- Completing either a 90 degree push-up, modified pull-up, pull up, or flexed arm hang to test upper body strength and endurance
- Completing either the back saver sit and reach test or the shoulder stretch to measure flexibility (Grissom, 2005, pp. 13-14; Welk & Meredith, 2008, pp. 1-2)

At each level, statistical data confirmed that “higher SAT scores were associated with higher levels of fitness” and “students who met minimum fitness levels in three or more physical fitness areas showed the greatest academic gains” (Blakemore, 2003, pp. 22-23). The volume of data provided in this study—353,000 5th graders, 322,000 7th graders, and 279,000 9th graders respectively—offer a significantly large pool of evidence that is measureable in terms of comparing PFT scores with the SAT9 (Blakemore, 2003, pp. 22-23).

In order to gauge the relationship between exercise and student achievement, “average achievement scores were calculated for each PFT score” (Grissom, 2005, pp. 16). Thus, researchers aggregated each individual PFT score (0-6) and derived a mean academic score through the SAT9, which then constituted a basis for linking student achievement to physical fitness. However, according to James B Grissom such a correlation should be “interpreted with caution” (Grissom, 2005, pp. 11). Through his analysis of the data, Grissom explains that a large variation in the reading scores of the SAT9 existed for students who earned the highest marks (6) on the PFT. While students who scored 6 on the PFT averaged 52 in the reading section of the SAT9—five points higher than students who scored a 5 on the assessment—the standard deviation materialized as 20 points higher and/or lower than the mean. Such deviation, according to Grissom, indicated a “considerable unaccounted test score variance,” which potentially misrepresents the correlation between academic achievement and physical fitness (Grissom, 2005, pp. 17).

Though Grissom’s arguments are valid in terms of utilizing variance as a device to gauge the validity of the PFT in relationship to SAT9 scores, issues arise in his

analysis to clearly define the essential physical components measured in the FITNESSGRAM test. Grissom highlights in his critical review “1) aerobic capacity, 2) body composition, and 3) trunk strength, 4) upper body strength, and 5) flexibility” as the five foundations of the assessment (Grissom, 2005, pp. 13). Yet, according to FITNESSGRAM, the PFT has been designed to measure: 1) aerobic capacity, 2) body composition, 3) muscular strength, 4) endurance, and 5) flexibility (Welk & Meredith, 2008, pp. 1-2). Trunk strength and upper body strength, upon further investigation, compose crucial facets of “muscular strength, muscular endurance and flexibility” within the FITNESSGRAM model (Welk & Meredith, 2008, pp. 11-3). Consequently, through his attempts to dissect the assessment into more concrete terms, Grissom fails to mention muscular strength and endurance as two primary components of the PFT. As a result of the multiple tests that compose muscular strength and endurance, further investigation and research may be necessary to define and clarify how each component is measured and ultimately scored.

Although data linking higher PFT scores to elevated student achievement exists on a large scale, the number of options provided students in order to complete the FITNESSGRAM assessment may also challenge the validity of the study. FITNESSGRAM offers the choice of completing either: a) PACER test, b) one mile run, or c) one mile walk to gauge aerobic capacity. As defined by the FITNESSGRAM/ACTIVITYGRAM Reference Guide (3rd Edition), aerobic capacity measures the “maximum rate of oxygen” that the body can employ during exercise (Welk & Meredith, 2008, pp. 9-3). This particular test seeks to measure a student’s ability to “transport oxygen to muscles” and sustain movement at longer intervals (Welk &

Meredith, 2008, pp. 9-3). The PACER, which involves students running “back and forth across a 20-meter course” at increasing levels of speed, poses aerobic challenges different from walking or running a mile at maximum speed (Welk & Meredith, 2008, pp. 9-4).

Different from the run/walk mile assessment, where participants complete the allocated distance as quickly as possible, individuals taking the PACER begin at a low pace and theoretically increase their speed with each subsequent minute (Welk & Meredith, 2008, pp. 9-4) The PACER, unlike the other two assessments, incorporates a programmed ascent in speed and intensity, which may influence how the body responds and ultimately performs aerobically throughout the course of the test. Thus, the level of physical intensity placed on the body in all three tests may differentiate. While such a variety of options allows test administrators to include participants ranging in size, ability, age, and gender, it may not take into account how the dissimilarity of the three assessments will affect the body on an aerobic scale and consequently challenge the validity of FITNESSGRAM to accurately measure aerobic capacity.

A further problem of validity may also arise while testing for body composition—weight and or percentage of body fat in proportion to height. Body Mass Index (BMI) has become the standard for finding whether individuals 20 and over possess a proportionate body weight/height ratio. With the formula of weight (kilograms) divided by height (meters) squared, a successive score places individuals into the categories of either: a) underweight, b) healthy weight, c) overweight, and or d) obese (Center for Disease Control and Prevention, 2011.). To place children and adolescents into groupings however, BMI calculations must also incorporate age and gender into the formula to accurately derive body-composition, components not imposed on adults (Centers for

Disease Control and Prevention, 2011). For children and adolescents under the age of 20, BMI calculations take into account: a) the proportion of fat differs in the physiological make up of boys and girls, and b) appropriate body weight changes as children mature with age more so than adults over 20. The margin of error while testing body composition among students with BMI may be greater than 5% according to FITNESSGRAM (The Cooper Institute, n.d., pp. 1). As a result of such heightened stipulations for calculating body composition and the potential for inaccurate categorization, the validity of BMI has been challenged and thus used as a second option by most test administrators.

Subsequently, FITNESSGRAM recommends the Skinfold Test to determine body composition (The Cooper Institute, n.d.). To measure the body composition of students, administrators use a caliper, a device designed to evaluate the amount and firmness of tissue beneath the outside layer of skin. Administrators measure the triceps and calf muscles in this assessment, searching for the midway point of each tissue. To find the midway point, practitioners are encouraged to suspend a piece of string across the tissue to make a more accurate prediction of its firmness, which will influence a student's body composition categorization. Once located, the midway point must be measured three times by a caliper in order to create a median score (The Cooper Institute, n.d.).

The midpoint of the muscles beneath the skin plays a vital role in determining body composition among students. Without accurately finding its placements, administrators may have a difficult time determining the firmness of the measured tissue. Consequently, the validity of this test may be challenged by insufficient procedures and recommendations for finding the precise midpoint. The primary employment of a string

as the sole strategy to find the midpoint could hinder an administrator's ability to accurately locate the center of the tissue. Likewise, the level of training provided practitioners and administrators might also play a vital role in accurately classifying the body composition of a student. Whether or not a practitioner holds the office of nurse/trained medical professional and/or school volunteer or parent/teacher could have an impact on the result of the test.

Validity of this test might also face another challenge depending on one's practice of eating/ hydrating and/or exercising prior to measurement. A student's accessibility to food and level of physical engagement before an assessment could enhance or deter a test administrator's ability to conclusively discern firm tissue from non-firm tissue. Since most students possess a high metabolic rate and a quickly changing physical body, the potential to overestimate or underestimate body fat as measured by the Skinfold Test remains prevalent.

Self-Efficacy, Emotional Well-Being, and Exercise

Research indicates that exercise and self-esteem/emotional well-being may hold a common link. One case study sought to determine if self-efficacy—the belief in oneself to accomplish “health related goals and “desired outcomes”—acted as the predominant factor influencing exercise regularity and patterns of physical fitness or lack thereof for adult participants (Bui, Howlett, & Kemp, 2011, pp. 182). In order to address this premise in the research, My Bui, Elyria Kemp, and Elizabeth Howlett utilized Albert Bandura's Theory of Self-Efficacy to development the Self-Efficacy and Exercise

Regularity Model and thus define why individuals succeed or fail in their attempts to manage weight (Bandura, 1986, 1997). The model encompasses four primary components: a) social persuasion via feedback; b) mastery experience; c) individual emotional state; and d) modeling (Bui, et al., 2011, pp. 185). Seven individuals interested in losing weight were selected for an interview process, each measuring a BMI just at “overweight” or below. Each participant, between the ages of 20-46, was asked to openly share about his or her relationship with exercise, food, family histories concerning weight loss, attainment of personal goals, and other factors that could influence physical exercise routines. Following the interview process, 233 additional people were surveyed on the topic of self-efficacy to test the accuracy of the original participants’ responses. Results from the model and research indicated that “higher levels of perceived self-efficacy are associated with increased frequency of exercise behavior” (Bui, et al., 2011, pp. 196). The model also indicated that “higher levels of health consciousness...correlated with exercise regularity” (Bui et al., 2011, pp. 196). Thus the study concluded that self-efficacy can and ultimately does help one become more health consciousness, both in terms of diet, exercise, self-esteem, and motivation.

While the participants interviewed for this study were older than primary and secondary students, the framework of the Self-Efficacy and Exercise Regularity Model offers insight into how children and adolescents may develop self-efficacy as a result of social persuasion via feedback (group interactions) and modeling through teacher mentorship in P.E. As findings from the study infer, individuals regardless of age have a greater chance of being effective in the pursuit of physical fitness when engaged within a community, composed of both peers and mentors. In conjunction with such results from

the model, Taras explains that students who participate in physical activity independently and collectively are also “likely to feel more connected to their school and community and want to challenge themselves” (Taras, 2005, pp. 214).

Taras affirms Bui et al. (2011) findings that young individuals also profit from physical activity by working collaboratively with others in the pursuit of independent fitness goals. Taras explains that having a connection to a school community could promote self-esteem for students in a physical and academic sense. Thus, exercise may even serve as the catalyst that allows students to feel safe with their peers and teachers as they begin to mature and change. He draws such insight from a critical review of the literature investigates how children and adolescents ages 5-18 may benefit academically and emotionally from physical activity—in the short term before assessments and also potentially throughout the course their academic careers. As background to his review, the author references the National Association for Sport and Physical Education (NASPE) and its recommendation for ongoing motor skill development as a necessary tool to promote “responsible personal and social behavior” (NASPE, 2004). Such dispositions, according to Taras, arise as a result of students engaging in routine and/or daily physical activity at school (Taras, 2005, pp. 214).

Further research also suggests that exercise not only improves self-image and self-esteem, but even strengthens cumulative emotional well-being and the potential for healing. Jorg Blech discusses how exercise can heal areas of trauma in both the mind and body. Blech explains that until recently physicians “recommended physical activity and sport as a preventative measure to avoid the outbreak of disease and disorders” (Blech, 2009, pp. 3). However, he finds in his research that medical professionals, from

cardiologists to psychologists, consistently utilize exercise in practice to heal and even revitalize damaged areas of the mind and body. When accompanied by standard therapies to treat physical and emotional ailments, his research concludes that a regimented plan of physical activity will often produce restorative outcomes for a majority of patients.

Additionally, Blech writes that physical exercise, when detached from typical therapies, will benefit patients in recovery even more profoundly, helping to stimulate healthy progress in diseased tissue and change the progression of an illness (Blech, 2009, pp. 3). Through his research with cancer survivors, communities confronting diabetes, and bodily active peoples like the Amish of Ontario, Canada, Blech determines that reengaging in an active life-style can curtail physical and emotional deterioration. He determines that individuals who develop a lifelong practice of physical activity may greatly enhance the cumulative quality and even duration of life, even during times of acute illness (Blech, 2009). Such findings, while founded more on quantitative data than qualitative research, highlight the potential development of intrapersonal and interpersonal dispositions, as defined by Gardner (1993, 2011), which could permit individuals of all ages to grow healthier and more able within a community framework of physical engagement. Particularly in the study of communities such as the Amish, which rely heavily on communal activities, projects, and social interactions to ensure the economic, academic, and spiritual development of the population, Taras (2005), Blech (2009) and Bui et al. (2011) make corresponding arguments that physical activity performed collectively provides the potential for independent cognitive and emotional development.

While Blech asserts that exercise can “literally turn a disease around,” he overlooks patients who may become too weak to engage in any form of physical movement due to the severity of an illness (Blech, 2009, pp. 3). Although the author has found examples of individuals surviving and even conquering diseases with the aid of exercise, he does not highlight the opposite spectrum of patients unable to benefit from any form of treatment due to the strength and speed of an illness. Despite the fact that Blech’s conclusions are consistent with the much of the literature that joins physical activity with cognitive development and emotional well-being, even for individuals diagnosed with mental illness, his broad findings raise questions to the validity that exercise positively impacts the health of a dominant majority of individuals, regardless of age and physical or psychological proclivity (Blech, 2009, pp. 16).

Furthermore, just as research offers many valid benefits for physical activity in correlation with improved self-esteem and social development skills, such findings often overlook the potential hazards of prolonged and excessive exercise routines in correlation with AN, BN, and BDD. Kay L. Grothaus writes that adolescents struggling with anorexia and or bulimia often engage in “excessive exercise” as a result of feeling “fat” and inadequate physically (Grothaus, 1998, pp. 148). The author explains in her review of the literature that “a typical anorexic client” often falls between the ages of 11 and 18. Such clients, characteristically female, can display “a relentless pursuit of thinness and low weight,” which turns obsessive in nature and potentially fatal (Grothaus, 1998, p. 148). Rather than strengthening the body and improving self-esteem, intense and prolonged exercise coupled with inadequate nutrition may serve as evidence of one’s

inability to adjust emotionally to daily challenges and care for the internal functioning of the body. Medical complications associated with AN and BN may also accompany:

- Elevated levels of mortality due to complications from eating disorders (Arcelus, Mitchell, Wales, & Nielson, 2011)
- Dehydration and acutely low levels of potassium in the blood stream, creating cardiac problems associated with heart palpitations
- Damage and tearing of the esophagus as a result of vomiting
- Impaired kidney function as measured by the glomerular filtration rater resulting in renal (kidney) insufficiency (Grothaus, 1998; Medline Plus, 2013)

Even though studies assessing heightened mortality rates for individuals diagnosed with AN and BN have struggled to pinpoint the primary cause, research confirms that such disorders bring about an acute risk for early death (Grothaus, 1998; Arcelus, et al, 2011). Research continues to conclude that such disorders serve as a principal cause for “disability among young women” (Striegel-Moore & Bulik, 2007, p. 181; Mathers, Vos, Stevenson, & Begg, 2000) and that “anorexia nervosa has the highest mortality rate of all mental disorders” (Striegel-Moore & Bulik, 2007, pp. 181; Millar , Wardell, Vyvyan, Naji, Prescott, & Eagles, 2005; Sullivan, 1995; Zipfel, Lowe, Reas, Deter, & Herzog, 2000). Furthermore, the literature reveals higher suicide rates for individuals diagnosed with an eating disorder, particularly for patients identified as anorexic (Arcelus et al., 2011).

Studies have found that those who suffer from AN display a type of "dependence" on authoritative/parental figures as result of familial enmeshment—a breakdown of

emotional boundaries between parents and children (Bruch, 1985; Kog & Vandereycken, 1989). In place of habitually utilizing exercise as a tool for cultivating physical and emotional stability, physical activity invariably appears as a compulsive expression of abusive patterns from home and or within the culture at large. Rather than stimulating emotional wellness, excessive exercise spurns patterns of self-care and turns destructive. While physical activity may have for a time served as a positive benefit, as trends in the research indicate, literature investigating eating disorder treatments concludes that exercise often cannot resolve compulsive behaviors on its own (Vanderlinden, Norre, & Vandereycken, 1989).

In the discussion of the potential addictive components of BN, Johan Vanderlinden, Jan Norre, and Walter Vandereycken explain that the fear of “becoming fat and the pursuit of slenderness as means to solve problems and/or deal with painful feelings” remains a widespread issue within the eating disorder community (Vanderlinden, et al, 1989, pp. 10). The ideal of slenderness and possessing an attractive body according to social standards of the time and place often over-shadow any psychological and emotional benefits typically associated with a disciplined program of exercise. Therefore, researchers such as Grothaus (1998), Bruch (1985), and Vanderlinden et al. (1989) determine that an over emphasis on the body through excessive exercise can lead to tragic and fatal outcomes for individuals struggling with eating disorders.

While previous academic scholarship on eating disorders has concentrated primarily on White/Caucasian females, often finding the highest frequency of AN and BN within this population, Debra Franko determines in her critical review of the literature that such conditions exist within immigrant and minority populations living in the U.S. (Striegel-

Moore, Dohm, et al., 2003; Franko, 2007). Pressures associated with adjusting and integrating into American life, including economic stress, have been found to potentially influence the frequency of eating disorders within such communities, particularly for persons identified with BN (Franko, 2007, pp. S31-S32). Although the ratio of diagnosis and duration of illness tend to vary within such groups, at times to a lesser aggregate for persons identified as anorexic, eating disorders still remain quite active within Black and Latino/Latina communities, particular among women. Since minority populations have experienced a stark degree of neglect in terms of academic research studying eating disorders within such communities, Franko recommends the “elucidation of culturally-sensitive diagnostic criteria” to better assess such conditions within a diversified American populace (Franko, 2007, pp. S31).

Results

In this critical review of the literature, the question has been asked: To what extent does exercise help primary and secondary students manage academic and emotional challenges?

Developments in the research indicate that exercise promotes positive test scores in reading and math for students advancing at grade level or possessing the potential to so. In accordance with Tremarche et al., 4th grade students given more time in physical education classes, 56 hours, tended to produce higher scores in math and reading than students afforded with less time, 28 hours (Tremarche et al., 2007). Another study, conducted by the California Department of Education (CDE) in conjunction with the FITNESSGRAM, found that 5th, 7th, and 9th grade students who achieved higher marks in

the physical fitness assessment were inclined to score higher in the math and reading sections of the SAT9 ((Blakemore, 2003, p. 22-23). While the number of adaptations in the fitness assessment pose challenges to the validity of the results, the large sample size of the study—353,000 5th graders, 322,000 7th graders, and 279,000 9th graders respectively—indicates that a majority of students have the potential to benefit academically from a daily routine of exercise that promotes aerobic capacity, body composition, muscular strength, endurance, and flexibility (Blakemore, 2003, pp. 22-23; Welk & Meredith, 2008, pp. 1-2).

In terms of theory, researchers such as Gardner (2011), Hannaford (1995), Taras (2005) Blech (2009), and Bui et al. (2011) agree that bodily-kinesthetic intelligence and exercise may help students develop emotional skills such as intrapersonal and interpersonal intelligence, self-esteem, and self-efficacy. Thus, research determines that physical activity can serve as a benefit to many students seeking to address both academic and emotional challenges within and outside of school. Gardner (1993) suggests that such bodily kinesthetic intelligence remains equally as important as mathematical and linguistic intelligence, and consequently should be cultivated in schools with equal concentration. In a similar manner, Blech (2009) explains that a repeated program of physical activity may help heal both the mind and body, aiding individuals of all ages to reach their highest emotional and cognitive potential over the course of a lifetime.

However, due to the structure of IQ tests that measure cognitive aptitude primarily through short answers and multiple choice questions, Gardner (1993) and Hannaford (1995) determine that students who learn effectively through exercise and

physical activity cannot be recognized in the same context as those who thrive in mathematics, science, and the language arts—i.e. Core Curriculum. Bodily-kinesthetic intelligence, which Gardner's sees as functioning most adeptly in the medical and creative arts, athletics, and craftsmanship, writes that physical intelligence, along with spatial, music, interpersonal, and intrapersonal intelligences, should garner far more focus in our assessments (Gardner, 1993, pp. 176).

Yet, despite the confirmable frequency of validity that links physical fitness with academic achievement and emotional well-being, students struggling with body image and eating compulsions often remain isolated from the long term benefits of physical activity. Children and adolescents diagnosed with anorexia nervosa (AN) and bulimia nervosa (BN), instead of advancing physiologically and cognitively as a result of staying physically active, may abuse the body and mind through over-exercise, leading to a breakdown of physical, emotional, and even cognitive functioning and development. Grothaus (1998) and Vanderlinden et al. (1989) determine that in place of cultivating skills for managing stress through physical engagement, such as self-esteem and self-efficacy, children and adolescents experiencing compulsive patterns associated with food and body image may over-exercise and thus compound feelings of fear and self-harm.

In the discussion of AN profiles, Grothaus (1998) and Bruch (1985) explain that obsessive behavior associated with weight and body image manifest as a consequence of feeling physically overweight and thus “powerless” in the pursuit for well-being (Grothaus, 1998, pp. 148). Grothaus explains that before the compulsion manifests, individuals who become anorexic feel “ineffective” at shaping the course of their lives and as a result, cultivate obsessive compulsive behaviors around body image as a means

of establishing a semblance of control (Grothaus, 1998, pp.148). Painful emotions and feelings often bridge into excessive exercise routines, which inevitably cannot benefit the physical functioning of the body, nor the cognitive or emotional stability of the mind.

Developments in the research suggest that reaching an “ideal weight” within social and/or BMI standards demonstrate self-efficacy and thus the cultivation of improved self-esteem (Bui et al., 2011, pp. 186). However, such research does not take into account children and adolescents facing BDD and/or eating disorders. The findings of Bui et al. (2011) illuminate a cultural assumption that the attainment of “ideal weight” will provide a high level of personal satisfaction to a majority of individuals (Bui et al., 2011, pp. 186). This point of view however, overlooks potentially hazardous physical and/or psychological consequences of over-exercise while also not taking into full account the growing minority of individuals struggling with eating disorders and/or BDD. While Bui et al. explain that moving toward an “ideal weight” inspires higher levels of personal satisfaction, such findings do not reflect the reality for many individuals who habitually feel over-weight and insufficient physically (Bui et al., 2011, p.186; Grothaus, 1998). Hence, such assumptions based on “ideal weight” demonstrate the strength of a cultural standard that places a premium on physical fitness that often eclipses emotional well-being, cognitive development, and academic achievement.

Discussion

Results from this critical review of literature provide credence to the on-going scholarly assessment that physical activity and improved fitness have the capacity to serve as an academic and emotional benefit to a majority of students. The capacity to

move and thus feel a variety of sensations and emotions in the body has been linked in the literature to on-going cognitive and emotional growth. While the long term effects of physical activity on student achievement remains inconclusive, trends in the research indicate a robust potential for such a correlation.

Gardner (2011), in the search of such a link, offers the idea of dance as a physical activity that can provide students with both vigorous sensory stimulation and positive mental interactions. The skills utilized in dance, such as musical and spatial intelligence, may help children and adolescents develop intrapersonal resilience, which promotes learning and eventually mastery of specific academic content. While Gardner reasons that the multiple intelligences function primarily on an independent basis—derived from his study of individuals who have experienced the loss of specific skills due to brain damage (Gardner, 1993)—his reflection on dance demonstrates an inherent intertwining of intelligences, which can be explored and further developed through physical movement. Hence, the application and language of dance may act as catalysis in the ongoing development of the remaining intelligences, which encompass mathematical/logical, spatial, linguistic, musical, interpersonal, intrapersonal, naturalistic, and existential.

Historically, emotions were inherently regarded as separate from the body. However, Hannaford explains that “Body, thought, and emotion are intimately bound together through intricate nerve networks,” which inform and “enrich our knowing” of the world (Hannaford, 1995, pp. 50). Hannaford explains in further detail that children and adolescents who learn to express emotions “naturally and responsibly” will become better able to utilize such feelings “constructively and creatively” as basic life skills (Hannaford, 1995, pp. 89). Consequently, Hannaford (1995) and Gardner (2011) each

agree that physical movement and bodily-kinesthetic intelligence offer students the opportunity to experience cognitive development through the body. Similar to dancers, who seek to articulate stories and experiences through a sequence of movements, Hannaford (1995) concludes that students also possess the desire to explore what they have learned through a physical expression of the body.

However, without taking strides as suggested to link exercise to deeper intrapersonal and interpersonal awareness, educators risk providing students with inadequate skills to manage social pressures associated with exercise and body image. As the research indicates, children and adolescents who struggle from compulsive eating disorders and BDD may not reap the same benefits of physical activity as those less affected by such conditions. Research indicates that the anxieties of students diagnosed with AN and BN become more compounded rather than alleviated through over-exercise. Hence, a growing number of young individuals remain at risk of physical, cognitive, and emotional deterioration as a result of social pressures associated with exercise and body image. Due to a developing cultural perspective that inspires students to view exercise as a means only to meet physical standards of slenderness, a greater number of children and adolescents risk falling into BDD/eating disorder behaviors, which may deter their potential to succeed academically and even mature into emotionally healthy adults.

Although issues surrounding exercise and body image may pose steep trials for many young people, these challenges can also inspire educators to develop fitness programs that inform students on the dangers of over-exercise and the necessity for nutritional balance and emotional health. Human beings, as both emotional and physical creatures, require a mixture of elements that help nourish both the body and the mind.

Thus, programs of physical fitness need to address social pressures related to the body and also begin to incorporate elements of self-care into a base curriculum that helps students recognize what they need in order to function at their highest potential. As educators grow more knowledgeable on the risks posed to students in terms of meeting an “ideal weight,” they can also begin to more cogently discuss and redefine physical and emotional health.

One way is to connect Gardner’s Theory of Multiple Intelligences to the treatment of eating disorders and BDD. The range of the multiple intelligences offers a glimpse into the concept that individuals learn and develop emotionally along a broad continuum. Gardner makes a compelling argument that each student possesses a set of skills that invariably holds the key to his or her success. If teachers and subsequent professionals remain open to the idea that a majority of students can become proficient in at least one area of content, they can also begin to incorporate the multiple intelligences into a broader life skills curriculum that includes on-going emotional and mental health. Gardner’s theory offers a template to help students rearticulate their experience with eating disorders and BDD in a manner that promotes novelty and on-going practice. Educators, by gearing their work toward the cumulative growth and emotional health of students through the multiple intelligences, will have a greater chance of inspiring proficiency and thus help young individuals incorporate their strengths into other facets of academic and social development.

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